

## **APPENDIX A**

### **CHRONOLOGY OF RUNS IN SLURRY BUBBLE COLUMN REACTORS**

## CHRONOLOGY OF RUNS MADE IN THE SLURRY BUBBLE COLUMN REACTORS DURING THE FOURTH QUARTER OF 1995

### Task 2.0 -- Catalyst Testing

#### Subtask 2.2 - Slurry Bubble Column Testing

Three runs were made (3060, 3061, and 4042) in the SBCR's at standard run conditions, but at a lower reaction temperature (220°C) using 15 gm of catalyst provided by Calsicat. Each catalyst (CAL.15, CAL.16, and CAL.17) contained 20% Co on alumina support with no additives or promoters, but were flaked in Soya wax. The CO conversion for each catalyst was 2% or lower so each run was terminated after a few hours.

Run 3062 in the M3-SBCR was started with a charge of 15 gm of Calsicat Catalyst No. CAL.19. This catalyst contained 20% Co on alumina support with no additives. The catalyst received was dry and approximately 50 gm was reduced in our hydrogenation unit at 350°C for 18 hours. The CO conversion was 13.6%, the THC productivity was 0.66 Kg C<sub>1</sub>+/Kg cat. hr., and the CH<sub>4</sub> selectivity was 3.2%. The results indicated that laboratory scale reduction of small batches of non-promoted Co/Al<sub>2</sub>O<sub>3</sub> catalyst resulted in a well reduced and very active catalyst.

Run 4045 in the M4-SBCR was started with a 15 gm of non-promoted Co/Al<sub>2</sub>O<sub>3</sub> catalyst supplied by Calsicat (CAL.20). A 220 gm batch was charged to our laboratory scale fluidized reduction unit and reduced at standard conditions. The CO conversion was only 3.4% at standard run conditions. The run was stopped and flushed out for the next run.

Run 4047 in the M4-SBCR was started with 15 gm of the non-promoted Co/Al<sub>2</sub>O<sub>3</sub> catalyst (CAL.20) that was recharged to the H<sub>2</sub> reduction unit and re-reduced in a 100 gm batch. The CO conversion only increased to 4.9%. The run was stopped and the unit was flushed out for the next run.

Run 4043 in the M4-SBCR was charged with 15 gm of a promoted catalyst from Calsicat (CAL.18) and run at standard startup conditions except a reaction temperature of 220°C. This catalyst contained 20% Co, 0.5% Ru, and 0.3% K and was hydrogen reduced and coated with Soya wax by Calsicat. The CO conversion was 8.4%, the THC was 0.41 Kg C<sub>1</sub>+/Kg catalyst/hr, and less than 1.0% CH<sub>4</sub> selectivity. This is about 90% of the catalyst activity that would be obtained by a dry catalyst - H<sub>2</sub> reduced and charged in synfluid.

Run 4048 in the M4-SBCR was started with 15 gm of a promoted catalyst from Calsicat (CAL.25) and run at the same conditions as the above runs. This catalyst contained 20% Co, 0.5% Ru, and 0.3% K and was hydrogen reduced at EI and charged in synfluid. The CO conversion was

9.5%, the THC was 0.46 Kg C<sub>1</sub>+/Kg catalyst hr., and less than 1.0% CH<sub>4</sub> selectivity. This catalyst activity was within the expected values obtained previously with similar catalysts.

## **APPENDIX B**

### **SLURRY BUBBLE COLUMN REACTOR DATA**

Table I. SUMMARY OF M3 SBCR RUN RESULTS

- a) Unless otherwise noted, total flow is ca. 15 L/min. STP, or 3 cm/sec linear gas flow.  
 b) Conversion is total CO conversion over the period (%).  
 c) Conversion and selectivities are calculated using N2 as an internal standard in the GC analysis of the offgas  
 d) Prod. rate: Rate for production of total hydrocarbons, C1+ (kg/kg cat., hr).  
 e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt, g | Per No | Time Start | Time Stop | Temp C | Pres psi | H2: CO | Synfl cc/hr | Conv. % | Prod. Rate | Selectivities |      |      |      | Alpha GC | Alpha Liq | fin/Paraffin |      | Olefins C6-18% | Comments   |
|--------|---------|------------|--------|------------|-----------|--------|----------|--------|-------------|---------|------------|---------------|------|------|------|----------|-----------|--------------|------|----------------|------------|
|        |         |            |        |            |           |        |          |        |             |         |            | %CH4          | %C2  | %C3+ | %CO2 |          |           | C3           | C4   |                |            |
| 2      | Co.001  | 16.5       | 1      | 162        | 177       | 225    | 450      | 2.0    | 20          | 15.9    | 0.70       | 2.3           | 0.81 | 96.4 | 0.53 | 0.98     | 0.88      | 5.00         | 2.27 | 25.2           |            |
| 2      | Co.001  | 16.5       | 2      | 202        | 228       | 200    | 450      | 2.0    | 20          | 3.9     | 0.17       | 0.0           | 0.0  | 99.9 | 0.00 | 0.81     | 0.91      | 0.00         | 0.00 | 21.7           |            |
| 2      | Co.001  | 16.5       | 3      | 254        | 280       | 240    | 450      | 2.0    | 20          | 30.9    | 1.36       | 11.7          | 1.8  | 85.5 | 1.04 | 0.87     | 0.77      | 2.63         | 1.64 | 22.4           |            |
| 2      | Co.001  | 16.5       | 4      | 302        | 323       | 225    | 450      | 1.2    | 20          | 9.9     | 0.59       | 0.7           | 0.3  | 98.4 | 0.67 | 0.76     | 0.90      | 0.00         | 7.14 | 29.4           |            |
| 2      | Co.001  | 16.5       | 5      | 350        | 372       | 225    | 450      | 2.0    | 20          | 15.3    | 0.68       | 6.0           | 1.0  | 92.5 | 0.49 | 0.84     | 0.88      | 4.00         | 2.70 | 23.1           |            |
| 2      | Co.001  | 16.5       | 6      | 398        | 420       | 225    | 300      | 2.0    | 20          | 12.5    | 0.55       | 6.1           | 1.13 | 92.2 | 0.63 | 0.79     | 0.86      | 4.35         | 2.86 | 21.7           |            |
| 2      | Co.001  | 16.5       | 7      | 446        | 468       | 240    | 300      | 2.0    | 20          | 22.9    | 1.02       | 16.5          | 0.81 | 81.5 | 1.16 | 0.71     | 0.79      | 3.03         | 1.79 | 22.4           |            |
| 2      | Co.001  | 16.5       | 8      | 494        | 516       | 240    | 600      | 2.0    | 20          | 29.9    | 1.33       | 12.6          | 1.6  | 85.0 | 0.84 | 0.76     | 0.82      | 2.63         | 1.69 | 22.4           |            |
| 2      | Co.001  | 16.5       | 9      | 517        | 540       | 240    | 600      | 2.0    | 0           | 29.5    | 1.31       | 12.0          | 1.72 | 85.3 | 0.96 | 0.76     | —         | 2.50         | 1.56 | 22.4           |            |
| 2      | Co.001  | 16.5       | 9      | 541        | 564       | 240    | 600      | 2.0    | 0           | 28.4    | 1.26       | 10.4          | 1.7  | 87.1 | 0.89 | 0.77     | —         | 3.03         | 1.72 | —              |            |
| 2      | Co.001  | 16.5       | 9      | 565        | 588       | 240    | 600      | 2.0    | 0           | 27.9    | 1.27       | 11.1          | 1.74 | 86.2 | 0.93 | 0.76     | —         | 3.03         | 1.72 | —              |            |
| 2      | Co.001  | 16.5       | 9      | 589        | 612       | 240    | 600      | 2.0    | 0           | 27.0    | 1.20       | 10.7          | 1.72 | 86.7 | 0.89 | 0.76     | 0.82      | 2.78         | 2.00 | —              |            |
| 2      | Co.001  | 16.5       | 10     | 637        | 660       | 240    | 600      | 2.0    | 20          | 26.4    | 1.17       | 11.0          | 1.7  | 86.4 | 0.85 | 0.77     | 0.83      | 2.86         | 1.96 | 22.4           | G.C. Calib |
| 2      | Co.001  | 16.5       | 11     | 684        | 706       | 225    | 450      | 2.0    | 20          | 11.6    | 0.51       | 5.4           | 1.0  | 93.0 | 0.61 | 0.81     | 0.87      | 5.26         | 3.45 | 23.8           |            |
| 3      | Co.005  | 19.5       | 1      | 12         | 36        | 240    | 450      | 2.0    | 20          | 33.2    | 1.23       | 5.6           | 1.61 | 91.8 | 1.06 | 0.80     | 0.81      | 2.04         | 1.27 | 23.1           | G.C. Calib |
| 3      | Co.005  | 19.5       | 2      | 60         | 84        | 220    | 450      | 2.0    | 20          | 15.0    | 0.56       | 2.9           | 0.61 | 96.2 | 0.24 | 0.86     | 0.87      | 4.55         | 3.23 | 21.7           |            |
| 3      | Co.005  | 19.5       | 3      | 108        | 132       | 240    | 450      | 1.2    | 20          | 18.5    | 0.94       | 6.9           | 1.0  | 91.3 | 0.85 | 0.81     | —         | 5.88         | 3.85 | 26.6           |            |
| 3      | Co.005  | 19.5       | 4      | 156        | 179       | 240    | 450      | 2.0    | 20          | 29.6    | 1.11       | 11.5          | 1.8  | 85.8 | 0.91 | 0.76     | 0.78      | 2.22         | 1.39 | 21.7           |            |
| 4      | Co.002  | 20.1       | 1      | 37         | 59        | 240    | 450      | 2.0    | 20          | 36.1    | 1.32       | 22.9          | 3.22 | 72.4 | 1.51 | 0.66     | 0.77      | 0.65         | 0.31 | 16.8           |            |
| 4      | Co.002  | 20.1       | 2      | 85         | 106       | 220    | 450      | 2.0    | 20          | 16.6    | 0.60       | 3.8           | 1.13 | 94.7 | 0.35 | 0.84     | 0.88      | 2.44         | 0.89 | —              |            |
| 4      | Co.002  | 20.1       | 3      | 133        | 149       | 210    | 600      | 1.0    | 20          | 5.2     | 0.28       | 0.0           | 0.0  | 99.1 | 0.87 | 0.89     | 0.94      | 0.00         | 0.00 | —              | Power Fail |
| 5      | Co.003  | 15.1       | 1      | 15         | 35        | 240    | 450      | 2.0    | 20          | 31.7    | 1.53       | 16.7          | 2.4  | 79.8 | 1.16 | 0.71     | —         | 1.30         | 0.60 | 18.2           | G.C. Calib |
| 5      | Co.003  | 15.1       | 2      | 61         | 83        | 220    | 450      | 2.0    | 20          | 13.2    | 0.63       | 5.1           | 1.0  | 93.4 | 0.51 | 0.82     | 0.90      | 4.55         | 1.89 | —              |            |
| 5      | Co.003  | 15.1       | 3      | 88         | 107       | 240    | 450      | 2.0    | 20          | 28.4    | 1.37       | 15.1          | 2.4  | 81.4 | 1.11 | 0.75     | —         | 1.45         | 0.97 | —              |            |
| 5      | Co.003  | 15.1       | 4      | 133        | 155       | 240    | 450      | 1.0    | 20          | 13.1    | 0.95       | 4.2           | 1.24 | 93.3 | 1.24 | 0.83     | 0.88      | 6.67         | 3.70 | —              |            |
| 5      | Co.003  | 15.1       | 5      | 181        | 203       | 240    | 600      | 1.0    | 20          | 13.4    | 0.97       | 3.9           | 1.1  | 93.7 | 1.30 | 0.81     | —         | 5.26         | 3.45 | 30.1           |            |
| 5      | Co.003  | 15.1       | 6      | 217        | 227       | 240    | 450      | 2.0    | 20          | 25.4    | 1.23       | 14.9          | 2.4  | 81.7 | 1.03 | 0.73     | —         | 1.89         | 1.19 | —              |            |
| 6      | Co.011  | 15.3       | 1      | 13         | 35        | 240    | 450      | 2.0    | 20          | 14.3    | 0.67       | 7.6           | 1.6  | 89.4 | 1.42 | 0.78     | 0.83      | 4.17         | 2.57 | 21.7           |            |
| 6      | Co.011  | 15.3       | 2      | 61         | 83        | 220    | 450      | 2.0    | 20          | 5.1     | 0.23       | 0.0           | 0.0  | 97.2 | 2.78 | 0.87     | 0.82      | —            | —    | —              |            |
| 6      | Co.011  | 15.3       | 3      | 88         | 107       | 240    | 450      | 2.0    | 20          | 13.5    | 0.63       | 5.4           | 1.7  | 91.1 | 1.86 | 0.79     | —         | 4.00         | 2.83 | —              |            |
| 6      | Co.011  | 15.3       | 4      | 133        | 155       | 240    | 450      | 1.0    | 20          | 6.3     | 0.44       | 0.4           | 1.02 | 95.5 | 3.05 | 0.82     | 0.88      | —            | —    | —              |            |
| 6      | Co.011  | 15.3       | 5      | 181        | 203       | 240    | 600      | 1.0    | 20          | 6.7     | 0.46       | 0.2           | 0.9  | 96.0 | 2.91 | 0.84     | 0.89      | 12.00        | 3.67 | 27.3           | G.C. Calib |
| 6      | Co.011  | 15.3       | 6      | 217        | 226       | 240    | 450      | 2.0    | 20          | 12.0    | 0.57       | 5.9           | 1.8  | 90.4 | 1.91 | 0.78     | —         | 4.40         | 2.43 | —              |            |
| 7      | Co.012  | 15.8       | 1      | 14         | 36        | 240    | 450      | 2.0    | 20          | 13.9    | 0.63       | 6.1           | 1.51 | 90.6 | 1.74 | 0.80     | 0.89      | 4.00         | 2.57 | 17.5           |            |
| 7      | Co.012  | 15.8       | 2      | 62         | 84        | 220    | 450      | 2.0    | 20          | 5.1     | 0.23       | 0.0           | 0.2  | 97.8 | 2.02 | 0.89     | 0.90      | —            | 2.50 | —              |            |
| 7      | Co.012  | 15.8       | 3      | 88         | 92        | 240    | 450      | 2.0    | 20          | 13.1    | 0.59       | 6.1           | 1.71 | 90.4 | 1.75 | 0.80     | —         | 5.00         | 2.25 | —              | Power Fail |
| 7      | Co.012  | 15.8       | 4      | 134        | 156       | 240    | 450      | 1.0    | 20          | 3.9     | 0.26       | 4.8           | 2.3  | 86.3 | 6.64 | 0.70     | 0.85      | 16.00        | 3.50 | —              |            |
| 7      | Co.012  | 15.8       | 5      | 182        | 204       | 240    | 600      | 1.0    | 20          | 4.3     | 0.28       | 0.1           | 2.1  | 91.6 | 9.29 | 0.75     | 0.82      | 8.50         | 3.50 | 30.8           |            |
| 7      | Co.012  | 15.8       | 6      | 218        | 227       | 240    | 450      | 2.0    | 20          | 7.2     | 0.32       | 7.3           | 3.2  | 85.1 | 4.45 | 0.70     | —         | 5.00         | 3.17 | —              |            |

Table I. SUMMARY OF SBCR RUN RESULTS (continued)

- a) Unless otherwise noted, total flow is ca. 15 L/min. STP, or 3 cm/sec linear gas flow.  
 b) Conversion is total CO conversion over the period (%).  
 c) Conversion and selectivities are calculated using N2 as an internal standard in the GC analysis of the offgas  
 d) Prod. rate: Rate for production of total hydrocarbons, C1+ (kg/kg cat.hr).  
 e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt.g | Per No | Time Start | Time Stop | Temp C | Pres psi | H2: CO | Synfl cc/hr | Conv. % | Prod. Rate | Selectivities |      |       |      | Alpha GC | Alpha Liq | fin/Paraffin |       | Olefins C6-18% | Comments    |
|--------|---------|-----------|--------|------------|-----------|--------|----------|--------|-------------|---------|------------|---------------|------|-------|------|----------|-----------|--------------|-------|----------------|-------------|
|        |         |           |        |            |           |        |          |        |             |         |            | %CH4          | %C2  | %C3+  | %CO2 |          |           | C3           | C4    |                |             |
| 8      | Co.015  | 15.0      | 1      | 14         | 35        | 240    | 450      | 2.0    | 20          | 28.3    | 1.37       | 12.7          | 2.0  | 84.1  | 1.24 | 0.76     | 0.80      | 1.61         | 1.07  | 19.6           | G.C. Calib  |
| 8      | Co.015  | 15.0      | 2      | 61         | 83        | 220    | 450      | 2.0    | 20          | 11.5    | 0.56       | 4.4           | 1.0  | 93.91 | 0.80 | 0.81     | 0.89      | 3.60         | 2.14  | --             |             |
| 8      | Co.015  | 15.0      | 3      | 97         | 106       | 240    | 450      | 2.0    | 20          | 26.4    | 1.28       | 13.2          | 2.11 | 83.5  | 1.12 | 0.75     | --        | 1.69         | 1.20  | --             |             |
| 8      | Co.015  | 15.0      | 4      | 133        | 155       | 240    | 450      | 1.0    | 20          | 11.5    | 0.83       | 4.8           | 1.2  | 92.5  | 1.53 | 0.80     | 0.85      | 5.60         | 3.29  | --             |             |
| 8      | Co.015  | 15.0      | 5      | 181        | 191       | 240    | 600      | 1.0    | 20          | 12.4    | 0.90       | 4.9           | 0.84 | 93.6  | 0.73 | 0.84     | 0.85      | 5.20         | 3.14  | 30.8           | Power Fail  |
| 9      | Co.011  | 15.0      | 1      | 13         | 35        | 240    | 450      | 2.0    | 20          | 18.5    | 0.89       | 8.8           | 1.7  | 88.8  | 0.77 | 0.78     | 0.83      | 3.18         | 1.85  | 20.3           | G.C. Calib  |
| 9      | Co.011  | 15.0      | 2      | 61         | 82        | 220    | 450      | 2.0    | 20          | 6.3     | 0.31       | 0.0           | 1.0  | 98.6  | 0.41 | 0.88     | 0.93      | 12           | 1.80  | --             |             |
| 9      | Co.011  | 15.0      | 3      | 97         | 107       | 240    | 450      | 2.0    | 20          | 16.6    | 0.80       | 8.4           | 2.1  | 88.7  | 0.81 | 0.77     | --        | 3.30         | 2.00  | --             |             |
| 9      | Co.011  | 15.0      | 4      | 133        | 155       | 240    | 450      | 1.0    | 20          | 8.0     | 0.58       | 1.3           | 1.31 | 96.3  | 1.16 | 0.82     | 0.87      | 7.00         | 2.83  | --             |             |
| 9      | Co.011  | 15.0      | 5      | 181        | 203       | 240    | 600      | 1.0    | 20          | 8.7     | 0.63       | 1.4           | 1.1  | 96.4  | 1.05 | 0.83     | 0.87      | 5.00         | 2.67  | 30.5           |             |
| 9      | Co.011  | 15.0      | 6      | 228        | 229       | 240    | 450      | 2.0    | 20          | 14.7    | 0.71       | 7.9           | 2.2  | 89.1  | 0.85 | 0.78     | --        | 3.78         | 1.67  | --             | Power Fail  |
| 11     | Co.017  | 15.0      | 1      | 9          | 31        | 240    | 450      | 2.0    | 20          | 27.2    | 1.32       | 11.2          | 1.8  | 85.9  | 1.14 | 0.77     | 0.80      | 2.09         | 1.20  | 30.8           |             |
| 11     | Co.017  | 15.0      | 2      | 55         | 79        | 220    | 450      | 2.0    | 20          | 11.4    | 0.55       | 5.0           | 0.0  | 94.8  | 0.22 | 0.88     | 0.90      | 5.00         | 3.20  | --             |             |
| 11     | Co.017  | 15.0      | 3      | 81         | 103       | 240    | 450      | 2.0    | 20          | 25.9    | 1.26       | 11.7          | 1.61 | 85.6  | 1.14 | 0.77     | --        | 1.95         | 1.26  | --             |             |
| 11     | Co.017  | 15.0      | 4      | 129        | 151       | 240    | 450      | 1.0    | 20          | 11.6    | 0.84       | 5.0           | 0.0  | 93.9  | 1.19 | 0.82     | 0.86      | 25.0         | 2.88  | --             |             |
| 11     | Co.017  | 15.0      | 5      | 177        | 199       | 240    | 600      | 1.0    | 20          | 11.6    | 0.84       | 4.2           | 0.0  | 94.7  | 1.17 | 0.86     | 0.86      | 24.0         | 1.63  | 21.0           | G.C. Calib  |
| 11     | Co.017  | 15.0      | 6      | 213        | 221       | 240    | 450      | 2.0    | 20          | 24.3    | 1.20       | 12.1          | 1.4  | 86.4  | 0.08 | 0.78     | --        | 2.47         | 1.64  | --             |             |
| 12     | Co.018  | 15.6      | 1      | 13         | 35        | 240    | 450      | 2.0    | 20          | 33.8    | 1.56       | 9.7           | 2.01 | 86.6  | 1.68 | 0.75     | 0.85      | 1.81         | 1.13  | 21.0           | G.C. Calib  |
| 12     | Co.018  | 15.6      | 2      | 61         | 80        | 220    | 450      | 2.0    | 20          | 12.6    | 0.59       | 2.8           | 0.0  | 97.1  | 0.08 | 0.90     | 0.88      | --           | --    | --             |             |
| 12     | Co.018  | 15.6      | 3      | 97         | 107       | 240    | 450      | 2.0    | 20          | 27.9    | 1.30       | 9.4           | 1.9  | 87.7  | 1.03 | 0.75     | --        | 2.65         | 2.17  | --             |             |
| 12     | Co.018  | 15.6      | 4      | 133        | 155       | 240    | 450      | 1.0    | 20          | 12.4    | 0.86       | 3.3           | 0.0  | 95.0  | 1.67 | 0.80     | 0.86      | --           | --    | --             |             |
| 12     | Co.018  | 15.6      | 5      | 181        | 203       | 240    | 600      | 1.0    | 20          | 13.0    | 0.90       | 3.2           | 0.0  | 94.9  | 1.86 | 0.80     | 0.85      | --           | --    | 38.5           |             |
| 12     | Co.018  | 15.6      | 6      | 217        | 226       | 240    | 450      | 2.0    | 20          | 26.4    | 1.22       | 10.1          | 1.4  | 86.8  | 1.74 | 0.73     | --        | 2.89         | 2.05  | --             |             |
| 13     | Co.016  | 14.7      | 1      | 16         | 35        | 240    | 450      | 2.0    | 20          | 26.4    | 1.31       | 8.3           | 1.71 | 89.3  | 0.68 | 0.78     | 0.81      | 2.00         | 1.41  | 21.7           | G.C. Calib  |
| 13     | Co.016  | 14.7      | 2      | 65         | 83        | 220    | 450      | 2.0    | 20          | 9.7     | 0.48       | 0.0           | 0.01 | 99.9  | 0.00 | 0.91     | 0.88      | --           | --    | --             | TCD weak.   |
| 13     | Co.016  | 14.7      | 3      | 89         | 105       | 240    | 450      | 2.0    | 20          | 25.2    | 1.25       | 9.2           | 1.72 | 88.6  | 0.51 | 0.78     | --        | 2.10         | 1.41  | --             | CH4 peaks   |
| 13     | Co.016  | 14.7      | 4      | 134        | 155       | 240    | 450      | 1.0    | 20          | 10.9    | 0.81       | 1.2           | 0.79 | 97.7  | 0.32 | 0.84     | 0.86      | --           | --    | --             | are lower   |
| 13     | Co.016  | 14.7      | 5      | 181        | 203       | 240    | 600      | 1.0    | 20          | 11.4    | 0.85       | 0.0           | 0.49 | 99.3  | 0.25 | 0.92     | 0.86      | --           | --    | 32.2           | than        |
| 13     | Co.016  | 14.7      | 6      | 210        | 226       | 240    | 450      | 2.0    | 20          | 22.7    | 1.12       | 3.8           | 1.98 | 93.7  | 0.46 | 0.79     | --        | 2.37         | 1.41  | --             | expected.   |
| 14     | Co.019  | 15.2      | 1      | 14         | 35        | 240    | 450      | 2.0    | 20          | 13.9    | 0.66       | 0.4           | 1.7  | 97.2  | 0.70 | 0.80     | 0.86      | 5.33         | 2.67  | 26.6           | G.C. Calib  |
| 14     | Co.019  | 15.2      | 2      | 66         | 83        | 220    | 450      | 2.0    | 20          | 3.8     | 0.18       | 0.0           | 1.71 | 96.7  | 1.56 | 0.88     | --        | --           | --    | --             | New TCD     |
| 14     | Co.019  | 15.2      | 3      | 88         | 105       | 240    | 450      | 2.0    | 20          | 12.2    | 0.57       | 0.0           | 2.03 | 96.3  | 1.67 | 0.80     | --        | 5.60         | 3.80  | --             |             |
| 14     | Co.019  | 15.2      | 4      | 133        | 155       | 240    | 450      | 1.0    | 20          | --      | --         | --            | --   | --    | 0.85 | --       | --        | --           | --    | --             | Repair G.C. |
| 14     | Co.019  | 15.2      | 5      | 169        | 178       | 240    | 600      | 1.0    | 20          | 5.9     | 0.41       | 0.0           | 1.5  | 96.1  | 2.42 | 0.80     | --        | 8.50         | 13.00 | --             | Valve Leak  |
| 14     | Co.019  | 15.2      | 6      | 193        | 203       | 240    | 450      | 2.0    | 20          | 10.2    | 0.48       | 0.8           | 2.23 | 95.0  | 1.96 | 0.79     | --        | 4.80         | 3.40  | --             | CH4 peaks   |
| 14     | Co.019  | 15.2      | 7      | 217        | 226       | 240    | 450      | 1.0    | 20          | 5.1     | 0.36       | 0.0           | 1.6  | 95.4  | 3.09 | 0.80     | --        | --           | --    | --             | undetected. |
| 15     | Co.005  | 14.7      | 2      | 62         | 83        | 220    | 450      | 2.0    | 20          | 10.7    | 0.53       | 0.0           | 0.94 | 98.4  | 0.70 | 0.83     | 0.88      | 4.25         | 3.25  | --             |             |
| 15     | Co.005  | 14.7      | 3      | 86         | 105       | 240    | 450      | 2.0    | 20          | 25.3    | 1.25       | 7.6           | 1.8  | 89.6  | 1.01 | 0.78     | --        | 2.42         | 1.50  | --             |             |
| 15     | Co.005  | 14.7      | 4      | 134        | 155       | 240    | 450      | 1.0    | 20          | 11.6    | 0.85       | 0.0           | 1.12 | 97.5  | 1.37 | 0.82     | 0.85      | 7.00         | 4.60  | --             |             |
| 15     | Co.005  | 14.7      | 5      | 182        | 203       | 240    | 600      | 1.0    | 20          | 12.3    | 0.90       | 0.0           | 1.0  | 97.7  | 1.33 | 0.83     | 0.85      | 7.00         | 4.40  | --             |             |
| 15     | Co.005  | 14.7      | 6      | 210        | 226       | 240    | 450      | 2.0    | 20          | 23.0    | 1.13       | 5.9           | 1.8  | 91.4  | 0.99 | 0.78     | --        | 3.20         | 2.00  | --             |             |

Table I. SUMMARY OF SBCR RUN RESULTS (continued)

- a) Unless otherwise noted, total flow is ca. 15 L/min. STP, or 3 cm/sec linear gas flow.  
 b) Conversion is total CO conversion over the period (%).  
 c) Conversion and selectivities are calculated using N<sub>2</sub> as an internal standard in the GC analysis of the offgas  
 d) Prod. rate: Rate for production of total hydrocarbons, C<sub>1</sub>+ (kg/kg cat., hr).  
 e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt,g | Per No | Time Start | Time Stop | Temp C | Pres psi | H2: CO | Synfl cc/hr | Conv. % | Prod. Rate | Selectivities |      |      |      | Alpha GC | Alpha Liq | fin/Paraffin |      | Olefins |             | Comments   |
|--------|---------|-----------|--------|------------|-----------|--------|----------|--------|-------------|---------|------------|---------------|------|------|------|----------|-----------|--------------|------|---------|-------------|------------|
|        |         |           |        |            |           |        |          |        |             |         |            | %CH4          | %C2  | %C3+ | %CO2 |          |           | C3           | C4   | C6-18%  |             |            |
| 16     | Co.002  | 15.4      | 1      | 14         | 35        | 240    | 450      | 2.0    | 20          | 30.1    | 1.42       | 12.5          | 2.52 | 83.9 | 1.09 | 0.75     | 0.80      | --           | 1.00 | 0.66    | 17.5        | G.C. Calib |
| 16     | Co.002  | 15.4      | 2      | 67         | 83        | 220    | 450      | 2.0    | 20          | 12.8    | 0.60       | 4.2           | 1.3  | 93.9 | 0.65 | 0.80     | 0.86      | 2.57         | 1.63 | --      |             |            |
| 16     | Co.002  | 15.4      | 3      | 91         | 107       | 240    | 450      | 2.0    | 20          | 28.2    | 1.34       | 17.3          | 2.91 | 78.8 | 0.99 | 0.71     | --        | 0.93         | 0.65 | --      |             |            |
| 16     | Co.002  | 15.4      | 4      | 136        | 155       | 240    | 450      | 1.0    | 20          | 12.6    | 0.89       | 4.4           | 1.61 | 92.8 | 1.21 | 0.79     | 0.84      | 4.43         | 2.88 | --      |             |            |
| 16     | Co.002  | 15.4      | 5      | 182        | 198       | 240    | 600      | 1.0    | 20          | 13.1    | 0.92       | 3.6           | 1.4  | 93.9 | 1.12 | 0.81     | 0.84      | 4.29         | 2.75 | 25.2    |             |            |
| 16     | Co.002  | 15.4      | 6      | 209        | 227       | 240    | 450      | 2.0    | 20          | 25.6    | 1.22       | 17.4          | 3.1  | 78.7 | 0.83 | 0.71     | --        | 1.00         | 0.66 | --      |             |            |
| 17     | Co.025  | 15.6      | 1      | 21         | 35        | 240    | 450      | 2.0    | 20          | 26.6    | 1.24       | 10.7          | 2.1  | 86.4 | 0.82 | 0.76     | 0.82      | 2.25         | 1.47 | 21.7    | G.C. Calib  |            |
| 17     | Co.025  | 15.6      | 2      | 62         | 83        | 220    | 450      | 2.0    | 20          | 8.4     | 0.39       | 0.0           | 1.1  | 96.9 | 1.94 | 0.82     | 0.92      | 6.50         | 3.00 | --      |             |            |
| 17     | Co.025  | 15.6      | 3      | 90         | 107       | 240    | 450      | 2.0    | 20          | 21.5    | 1.00       | 9.0           | 2.03 | 88.0 | 1.03 | 0.77     | --        | 2.64         | 1.64 | --      |             |            |
| 17     | Co.025  | 15.6      | 4      | 134        | 155       | 240    | 450      | 1.0    | 20          | 10.3    | 0.71       | 0.8           | 1.2  | 96.7 | 1.30 | 0.82     | 0.93      | 7.67         | 4.25 | --      |             |            |
| 17     | Co.025  | 15.6      | 5      | 181        | 203       | 240    | 600      | 1.0    | 20          | 11.7    | 0.81       | 1.3           | 1.12 | 96.5 | 1.12 | 0.83     | 0.88      | 8.00         | 4.25 | 32.9    |             |            |
| 17     | Co.025  | 15.6      | 6      | 217        | 226       | 240    | 450      | 2.0    | 20          | 19.9    | 0.93       | 9.3           | 2.2  | 87.7 | 0.91 | 0.76     | --        | 2.92         | 1.85 | --      |             |            |
| 18     | Co.004  | 15.0      | 1      | 20         | 39        | 240    | 450      | 2.0    | 20          | 33.9    | 1.64       | 15.3          | 2.4  | 80.9 | 1.37 | 0.74     | 0.79      | 1.17         | 0.78 | 20.3    | Repair G.C. |            |
| 18     | Co.004  | 15.0      | 2      | 66         | 87        | 220    | 450      | 2.0    | 20          | 15.1    | 0.73       | 4.1           | 1.61 | 94.0 | 0.29 | 0.81     | 0.85      | 3.83         | 2.25 | --      |             |            |
| 18     | Co.004  | 15.0      | 3      | 92         | 111       | 240    | 450      | 2.0    | 20          | 32.7    | 1.59       | 15.7          | 2.6  | 80.2 | 1.49 | 0.73     | --        | 1.20         | 0.80 | --      |             |            |
| 18     | Co.004  | 15.0      | 4      | 138        | 159       | 240    | 450      | 1.0    | 20          | 14.7    | 1.06       | 4.1           | 1.24 | 93.2 | 1.44 | 0.80     | 0.83      | 6.17         | 3.75 | --      |             |            |
| 18     | Co.004  | 15.0      | 5      | 186        | 207       | 240    | 600      | 1.0    | 20          | 15.0    | 1.09       | 3.6           | 1.13 | 94.1 | 1.18 | 0.82     | 0.83      | 5.67         | 4.00 | 33.6    |             |            |
| 18     | Co.004  | 15.0      | 6      | 214        | 230       | 240    | 450      | 2.0    | 20          | 28.4    | 1.38       | 14.9          | 2.5  | 86.5 | 1.13 | 0.73     | --        | 1.58         | 1.03 | --      |             |            |
| 19     | Co.021  | 15.6      | 1      | 16         | 35        | 240    | 450      | 2.0    | 20          | 23.2    | 1.08       | 9.4           | 2.0  | 88.0 | 0.73 | 0.77     | 0.82      | 2.56         | 1.54 | 20.3    |             |            |
| 19     | Co.021  | 15.6      | 2      | 62         | 83        | 220    | 450      | 2.0    | 20          | 8.3     | 0.38       | 0.0           | 1.3  | 98.2 | 0.51 | 0.82     | 0.88      | 4.33         | 3.33 | --      |             |            |
| 19     | Co.021  | 15.6      | 3      | 90         | 107       | 240    | 450      | 2.0    | 20          | 21.8    | 1.02       | 10.2          | 2.2  | 86.7 | 0.95 | 0.76     | --        | 2.50         | 1.53 | --      |             |            |
| 19     | Co.021  | 15.6      | 4      | 134        | 155       | 240    | 450      | 1.0    | 20          | 9.9     | 0.69       | 1.7           | 1.6  | 95.5 | 1.41 | 0.81     | 0.83      | 6.00         | 3.80 | --      |             |            |
| 19     | Co.021  | 15.6      | 5      | 182        | 203       | 240    | 600      | 1.0    | 20          | 11.5    | 0.80       | 1.8           | 1.22 | 95.8 | 1.16 | 0.83     | 0.85      | 6.50         | 3.80 | 30.8    |             |            |
| 19     | Co.021  | 15.6      | 6      | 210        | 226       | 240    | 450      | 2.0    | 20          | 19.9    | 0.93       | 9.6           | 2.3  | 87.2 | 0.95 | 0.76     | --        | 2.31         | 1.38 | --      |             |            |
| 20     | Co.041  | 15.8      | 1      | 17         | 37        | 240    | 450      | 2.0    | 20          | 25.3    | 1.16       | 11.0          | 2.1  | 86.0 | 0.88 | 0.76     | 0.84      | 2.94         | 1.61 | 20.3    |             |            |
| 20     | Co.041  | 15.8      | 2      | 66         | 75        | 220    | 450      | 2.0    | 20          | 9.1     | 0.41       | 0.0           | 1.51 | 97.8 | 0.65 | 0.82     | 0.91      | 8.00         | 2.75 | --      |             |            |
| 20     | Co.041  | 15.8      | 3      | 90         | 109       | 240    | 450      | 2.0    | 20          | 26.3    | 1.21       | 9.5           | 1.9  | 87.8 | 0.82 | 0.78     | --        | 2.81         | 1.71 | --      |             |            |
| 20     | Co.041  | 15.8      | 4      | 136        | 148       | 240    | 450      | 1.0    | 20          | 12.7    | 0.88       | 1.9           | 1.2  | 95.9 | 0.95 | 0.83     | 0.86      | 9.00         | 4.20 | --      |             |            |
| 20     | Co.041  | 15.8      | 5      | 169        | 178       | 240    | 600      | 1.0    | 20          | 13.2    | 0.91       | 2.0           | 1.01 | 96.1 | 0.93 | 0.84     | --        | 7.00         | 3.50 | --      |             |            |
| 20     | Co.041  | 15.8      | 6      | 193        | 203       | 240    | 450      | 2.0    | 20          | 24.6    | 1.13       | 9.4           | 1.8  | 87.9 | 0.92 | 0.78     | --        | 2.93         | 1.75 | --      |             |            |
| 21     | Co.014  | 15.1      | 1      | 24         | 38        | 240    | 450      | 2.0    | 20          | 8.5     | 0.40       | 8.3           | 3.54 | 85.8 | 2.43 | 0.74     | 0.83      | 2.75         | 1.67 | 17.5    | G.C. Calib  |            |
| 21     | Co.014  | 15.1      | 2      | 68         | 86        | 220    | 450      | 2.0    | 20          | 3.2     | 0.15       | 0.0           | 2.34 | 93.4 | 4.31 | 0.76     | 0.86      | 3.50         | 3.00 | --      |             |            |
| 21     | Co.014  | 15.1      | 3      | 93         | 110       | 240    | 450      | 2.0    | 20          | 7.1     | 0.34       | 8.7           | 3.0  | 85.9 | 2.46 | 0.71     | --        | 3.00         | 2.00 | --      |             |            |
| 21     | Co.014  | 15.1      | 4      | 138        | 157       | 240    | 450      | 1.0    | 20          | 2.2     | 0.15       | 0.0           | 2.8  | 89.3 | 7.92 | 0.67     | 0.84      | 9.00         | 4.00 | --      |             |            |
| 21     | Co.014  | 15.1      | 5      | 186        | 206       | 240    | 600      | 1.0    | 20          | 2.1     | 0.15       | 0.0           | 2.6  | 94.8 | 2.68 | 0.71     | 0.81      | 4.50         | 3.50 | --      |             |            |
| 22     | Co.040  | 14.5      | 1      | 19         | 32        | 240    | 450      | 2.0    | 20          | 1.8     | 0.09       | 0.0           | 4.01 | 94.1 | 1.89 | 0.71     | 0.82      | 2.50         | 2.00 | --      | G.C. Calib  |            |
| 22     | Co.040  | 14.5      | 2      | 43         | 63        | 220    | 450      | 2.0    | 20          | 0.7     | 0.03       | 0.0           | 0.73 | 97.1 | 2.17 | 0.91     | --        | 1.00         | 2.00 | --      | Shut down   |            |

Table I. SUMMARY OF SBCR RUN RESULTS (continued)

a) Unless otherwise noted, total flow is ca. 15 L/min, STP, or 3 cm/sec linear gas flow.

b) Conversion is total CO conversion over the period (%).

c) Conversion and selectivities are calculated using N2 as an internal standard in the GC analysis of the offgas

d) Prod. rate: Rate for production of total hydrocarbons, C1+ (kg/kg cat./hr).

e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt, g | Per No | Time Start | Time Stop | Temp C | Pres psi | H2: CO | Synfl cc/hr | Conv. % | Prod. Rate | Selectivities |      |      |      | Alpha GC | Alpha Liq | fin/Paraffin |      | Olefins C6-18% | Comments    |
|--------|---------|------------|--------|------------|-----------|--------|----------|--------|-------------|---------|------------|---------------|------|------|------|----------|-----------|--------------|------|----------------|-------------|
| 23     | Co.047  | 15.8       | 1      | 21         | 39        | 240    | 450      | 2.0    | 20          | 28.2    | 1.29       | 7.7           | 1.5  | 89.3 | 1.47 | 0.79     | 0.84      | 3.14         | 1.69 | 24.5           |             |
| 23     | Co.047  | 15.8       | 2      |            |           | 220    | 450      | 2.0    | 20          | --      | --         | --            | --   | --   | --   | --       | --        | --           | --   | --             | Repair G.C. |
| 23     | Co.047  | 15.8       | 3      | 94         | 111       | 240    | 450      | 2.0    | 20          | 25.6    | 1.17       | 8.9           | 1.5  | 88.2 | 1.38 | 0.78     | --        | 3.15         | 2.00 | --             |             |
| 23     | Co.047  | 15.8       | 4      | 141        | 159       | 240    | 450      | 1.0    | 20          | 11.9    | 0.81       | 2.9           | 0.9  | 94.1 | 2.13 | 0.82     | 0.88      | 7.33         | 4.75 | --             |             |
| 23     | Co.047  | 15.8       | 5      | 187        | 207       | 240    | 600      | 1.0    | 20          | 11.8    | 0.81       | 2.6           | 0.8  | 94.6 | 2.01 | 0.82     | 0.87      | 7.00         | 3.60 | --             |             |
| 23     | Co.047  | 15.8       | 6      | 215        | 226       | 240    | 450      | 2.0    | 20          | 24.0    | 1.10       | 10.7          | 1.9  | 85.7 | 1.71 | 0.75     | --        | 3.54         | 2.13 | --             |             |
| 24     | Co.049  | 15.6       | 1      | 19         | 39        | 240    | 450      | 2.0    | 20          | 30.6    | 1.41       | 10.9          | 1.8  | 85.7 | 1.66 | 0.76     | 0.82      | 2.09         | 1.30 | 14.0           |             |
| 24     | Co.049  | 15.6       | 2      | 71         | 87        | 220    | 450      | 2.0    | 20          | 12.0    | 1.07       | 2.7           | 0.9  | 95.3 | 1.09 | 0.81     | 0.95      | 4.25         | 3.25 | --             |             |
| 24     | Co.049  | 15.6       | 3      | 95         | 111       | 240    | 450      | 2.0    | 20          | 29.5    | 1.37       | 9.5           | 1.6  | 87.6 | 1.30 | 0.78     | --        | 2.32         | 1.40 | --             |             |
| 24     | Co.049  | 15.6       | 4      | 139        | 159       | 240    | 450      | 1.0    | 20          | 12.6    | 0.87       | 3.1           | 1.0  | 94.1 | 1.80 | 0.81     | 0.86      | 8.33         | 4.20 | --             |             |
| 24     | Co.049  | 15.6       | 5      | 187        | 207       | 240    | 600      | 1.0    | 20          | 13.4    | 0.93       | 2.6           | 0.9  | 94.8 | 1.68 | 0.82     | 0.88      | 8.33         | 4.20 | 37.8           |             |
| 24     | Co.049  | 15.6       | 6      | 211        | 231       | 240    | 450      | 2.0    | 20          | 24.9    | 1.16       | 10.4          | 1.7  | 86.5 | 1.36 | 0.76     | --        | 2.75         | 1.75 | --             |             |
| 25     | Co.047  | 15.6       | 1      | 19         | 33        | 240    | 450      | 2.0    | 20          | 28.1    | 1.30       | 8.8           | 1.6  | 88.1 | 1.50 | 0.78     | 0.85      | 2.93         | 1.88 | 25.9           | Repeat R23  |
| 25     | Co.047  | 15.6       | 2      | 55         | 69        | 220    | 450      | 2.0    | 20          | 7.4     | 0.34       | 1.5           | 1.2  | 96.3 | 1.02 | 0.76     | 0.89      | 3.00         | 4.67 | --             |             |
| 25     | Co.047  | 15.6       | 3      | 93         | 159       | 240    | 450      | 2.0    | 20          | 25.6    | 1.19       | 8.9           | 1.6  | 87.9 | 1.48 | 0.77     | --        | 3.14         | 2.00 | --             |             |
| 25     | Co.047  | 15.6       | 4      | 143        | 159       | 240    | 450      | 1.0    | 20          | 10.8    | 0.75       | 3.0           | 1.0  | 94.2 | 1.84 | 0.81     | 0.94      | 8.00         | 4.75 | --             |             |
| 25     | Co.047  | 15.6       | 5      | 189        | 207       | 240    | 600      | 1.0    | 20          | 12.4    | 0.86       | 2.2           | 0.8  | 95.6 | 1.39 | 0.83     | 0.86      | 7.33         | 4.50 | 36.4           |             |
| 25     | Co.047  | 15.6       | 6      | 215        | 231       | 240    | 450      | 2.0    | 20          | 23.2    | 1.08       | 9.6           | 1.7  | 87.4 | 1.28 | 0.77     | --        | 3.50         | 2.07 | --             |             |
| 26     | Co.031  | 15.9       | 1      | 19         | 39        | 240    | 450      | 2.0    | 20          | 30.9    | 1.41       | 12.1          | 1.9  | 84.9 | 1.12 | 0.75     | 0.83      | 1.83         | 1.14 | 22.4           |             |
| 26     | Co.031  | 15.9       | 2      | 67         | 87        | 220    | 450      | 2.0    | 20          | 13.6    | 0.62       | 3.9           | 0.9  | 94.6 | 0.49 | 0.80     | 0.85      | 4.20         | 2.67 | --             |             |
| 26     | Co.031  | 15.9       | 3      | 93         | 111       | 240    | 450      | 2.0    | 20          | 29.5    | 1.35       | 12.2          | 2.1  | 84.6 | 1.15 | 0.75     | --        | 1.97         | 1.25 | --             |             |
| 26     | Co.031  | 15.9       | 4      | 141        | 159       | 240    | 450      | 1.0    | 20          | 12.9    | 0.88       | 3.6           | 1.1  | 94.3 | 1.11 | 0.80     | 0.88      | 7.75         | 4.00 | --             |             |
| 26     | Co.031  | 15.9       | 5      | 189        | 207       | 240    | 600      | 1.0    | 20          | 13.9    | 0.95       | 3.5           | 1.0  | 94.4 | 1.12 | 0.81     | 0.85      | 6.80         | 3.71 | 30.1           |             |
| 26     | Co.031  | 15.9       | 6      | 221        | 230       | 240    | 450      | 2.0    | 20          | 26.6    | 1.22       | 12.0          | 2.2  | 84.9 | 0.96 | 0.74     | --        | 2.30         | 1.43 | --             |             |
| 27     | Co.029  | 15.9       | 1      | 23         | 39        | 240    | 450      | 2.0    | 20          | 28.3    | 1.27       | 8.3           | 1.6  | 87.9 | 2.21 | 0.77     | 0.84      | 3.40         | 2.20 | 27.3           |             |
| 27     | Co.029  | 15.9       | 2      | 71         | 87        | 220    | 450      | 2.0    | 20          | 9.5     | 0.43       | 1.7           | 1.1  | 96.0 | 1.23 | 0.80     | 0.89      | 5.67         | 3.00 | --             |             |
| 27     | Co.029  | 15.9       | 3      | 99         | 111       | 240    | 450      | 2.0    | 20          | 25.7    | 1.16       | 7.7           | 1.6  | 88.8 | 1.86 | 0.78     | --        | 4.00         | 2.36 | --             |             |
| 27     | Co.029  | 15.9       | 4      | 150        | 159       | 240    | 450      | 1.0    | 20          | 12.0    | 0.82       | 1.9           | 0.9  | 95.4 | 1.88 | 0.83     | 0.90      | 8.33         | 4.75 | --             |             |
| 27     | Co.029  | 15.9       | 5      | 191        | 207       | 240    | 600      | 1.0    | 20          | 12.1    | 0.82       | 1.7           | 0.9  | 95.6 | 1.75 | 0.83     | 0.89      | 7.67         | 4.75 | 39.9           |             |
| 27     | Co.029  | 15.9       | 6      | 222        | 230       | 240    | 450      | 2.0    | 20          | 23.7    | 1.08       | 8.2           | 1.7  | 88.5 | 1.60 | 0.78     | --        | 3.92         | 2.67 | --             |             |
| 28     | CoW.01  | 15.0       | 1      | 19         | 36        | 240    | 450      | 2.0    | 20          | 1.1     | 0.05       | 0.0           | 12.9 | 83.9 | 4.23 | 0.58     | --        | 3.33         | 2.50 | --             | Shut down   |



Table I. SUMMARY OF SBCR RUN RESULTS (continued)

- a) Unless otherwise noted, total flow is ca. 15 L/min. STP, or 3 cm/sec linear gas flow.  
 b) Conversion is total CO conversion over the period (%).  
 c) Conversion and selectivities are calculated using N<sub>2</sub> as an internal standard in the GC analysis of the offgas  
 d) Prod. rate: Rate for production of total hydrocarbons, C<sub>1</sub>+ (kg/kg cat., hr).  
 e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt.g | Per No | Time Start | Time Stop | Temp C | Pres psi | H <sub>2</sub> : CO | Synfl cc/hr | Conv. % | Prod. Rate | Selectivities    |                 |                   |                  | Alpha GC | Alpha Liq | fin/Paraffin   |                | Olefins C <sub>6</sub> -18% | Comments   |
|--------|---------|-----------|--------|------------|-----------|--------|----------|---------------------|-------------|---------|------------|------------------|-----------------|-------------------|------------------|----------|-----------|----------------|----------------|-----------------------------|------------|
|        |         |           |        |            |           |        |          |                     |             |         |            | %CH <sub>4</sub> | %C <sub>2</sub> | %C <sub>3</sub> + | %CO <sub>2</sub> |          |           | C <sub>3</sub> | C <sub>4</sub> |                             |            |
| 29     | Co.053  | 25.2      | 1      | 21         | 39        | 240    | 450      | 2.0                 | 20          | 42.0    | 1.19       | 15.8             | 2.3             | 79.5              | 2.42             | 0.73     | --        | 1.00           | 0.67           | 17.5                        |            |
| 29     | Co.053  | 25.2      | 2      | 71         | 87        | 220    | 450      | 2.0                 | 20          | 20.5    | 0.59       | 5.7              | 4.8             | 89.0              | 0.50             | 0.79     | 0.84      | 3.38           | 2.10           | --                          |            |
| 29     | Co.053  | 25.2      | 3      | 95         | 111       | 240    | 450      | 2.0                 | 20          | 39.2    | 1.13       | 15.8             | 2.9             | 79.2              | 2.09             | 0.72     | --        | 1.11           | 0.74           | --                          |            |
| 29     | Co.053  | 25.2      | 4      | 143        | 159       | 240    | 450      | 1.0                 | 20          | 18.4    | 0.79       | 5.3              | 2.6             | 90.6              | 1.52             | 0.80     | 0.84      | 5.86           | 3.56           | --                          |            |
| 29     | Co.053  | 25.2      | 5      | 191        | 207       | 240    | 600      | 1.0                 | 20          | 19.7    | 0.85       | 4.6              | 1.2             | 92.9              | 1.34             | 0.82     | --        | 5.71           | 3.44           | 33.6                        |            |
| 29     | Co.053  | 25.2      | 6      | 239        | 255       | 240    | 600      | 2.0                 | 20          | 40.8    | 1.17       | 14.8             | 2.1             | 81.4              | 1.68             | 0.75     | 0.80      | 1.10           | 0.74           | --                          |            |
| 29     | Co.053  | 25.2      | 7      | 303        | 304       | 240    | 450      | 2.0                 | 20          | 31.5    | 0.45       | 21.0             | 3.9             | 72.2              | 2.93             | 0.63     | --        | 1.34           | 0.97           | --                          | G.C. Calib |
| 29     | Co.053  | 25.2      | 8      | 332        | 351       | 260    | 450      | 2.0                 | 20          | 31.0    | 0.44       | 36.4             | 5.3             | 52.6              | 5.74             | 0.52     | --        | 2.60           | 1.75           | --                          |            |
| 29     | Co.053  | 25.2      | 9      | 375        | 376       | 240    | 450      | 2.0                 | 20          | 18.0    | 0.55       | 23.0             | 3.5             | 72.1              | 1.46             | 0.66     | --        | 3.21           | 2.05           | --                          |            |
| 29     | Co.053  | 25.2      | 10     | 415        | 423       | 240    | 450      | 2.0                 | 20          | 21.6    | 0.98       | 14.4             | 2.5             | 82.4              | 0.82             | 0.72     | 0.79      | 2.87           | 1.79           | 25.9                        | G.C. Calib |

Feed Gas Rates for Run 29

| Per No | N <sub>2</sub> Sl/h | H <sub>2</sub> Sl/h | CO Sl/h | Total Sl/h |
|--------|---------------------|---------------------|---------|------------|
| 1      | 565                 | 225                 | 112     | 902        |
| 2      | 565                 | 225                 | 112     | 902        |
| 3      | 565                 | 225                 | 112     | 902        |
| 4      | 565                 | 169                 | 169     | 903        |
| 5      | 565                 | 169                 | 169     | 903        |
| 6      | 565                 | 225                 | 112     | 902        |
| 7      | 733                 | 112                 | 56      | 901        |
| 8      | 733                 | 112                 | 56      | 901        |
| 9      | 551                 | 234                 | 117     | 912        |
| 10     | 367                 | 348                 | 175     | 890        |

Table I. SUMMARY OF SBCR RUN RESULTS (continued)

- a) Unless otherwise noted, total flow is ca. 15 L/min. STP, or 3 cm/sec linear gas flow.  
 b) Conversion is total CO conversion over the period (%).  
 c) Conversion and selectivities are calculated using N2 as an internal standard in the GC analysis of the offgas.  
 d) Prod. rate: Rate for production of total hydrocarbons, C1+ (kg/kg cat., hr).  
 e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt,g | Per No | Time Start | Time Stop | Temp C | Pres psi | H2: CO | Synfl cc/hr | Conv. % | Prod. Rate | Selectivities |      |      |      | Alpha GC | Alpha Liq | fin/Paraffin |      | Olefins C6-18% | Comments     |
|--------|---------|-----------|--------|------------|-----------|--------|----------|--------|-------------|---------|------------|---------------|------|------|------|----------|-----------|--------------|------|----------------|--------------|
|        |         |           |        |            |           |        |          |        |             |         |            | %CH4          | %C2  | %C3+ | %CO2 |          |           | C3           | C4   |                |              |
| 30     | Co.053  | 29.6      | 1      | 26         | 39        | 240    | 450      | 2.0    | 20          | 41.8    | 1.02       | 22.6          | 2.9  | 71.5 | 3.05 | 0.66     | 0.77      | 0.99         | 0.65 | 19.6           |              |
| 30     | Co.053  | 29.6      | 2      | 55         | 63        | 260    | 450      | 2.0    | 20          | 46.9    | 1.11       | 40.6          | 5.5  | 46.0 | 7.98 | 0.45     | --        | 0.83         | 0.64 | --             |              |
| 30     | Co.053  | 29.6      | 3      | 79         | 87        | 280    | 450      | 2.0    | 20          | 41.4    | 0.96       | 41.9          | 6.5  | 42.0 | 9.63 | 0.40     | --        | 2.06         | 1.35 | --             |              |
| 30     | Co.053  | 29.6      | 4      | 103        | 111       | 240    | 450      | 2.0    | 20          | 19.9    | 0.49       | 19.2          | 3.6  | 75.8 | 1.45 | 0.64     | --        | 4.29         | 2.50 | --             |              |
| 30     | Co.053  | 29.6      | 5      | 131        | 135       | 265    | 450      | 2.0    | 20          | 36.4    | 0.89       | 36.4          | 5.2  | 54.4 | 4.04 | 0.53     | --        | 2.45         | 1.60 | --             |              |
| 30     | Co.053  | 29.6      | 6      | 154        | 159       | 280    | 450      | 2.0    | 20          | 39.6    | 0.96       | 48.3          | 5.9  | 39.0 | 6.84 | 0.40     | --        | 2.44         | 1.62 | --             |              |
| 30     | Co.053  | 29.6      | 7      | 174        | 183       | 300    | 450      | 2.0    | 20          | 40.7    | 0.94       | 42.4          | 6.8  | 40.7 | 10.2 | 0.47     | --        | 3.11         | 2.03 | --             |              |
| 30     | Co.053  | 29.6      | 8      | 198        | 207       | 309    | 450      | 2.0    | 20          | 38.3    | 0.85       | 22.8          | 7.3  | 58.3 | 11.6 | 0.62     | --        | 3.76         | 2.48 | --             | G.C. Calib   |
| 30     | Co.053  | 29.6      | 9      | 220        | 231       | 310    | 450      | 2.0    | 20          | 37.5    | 0.87       | 55.5          | 7.2  | 25.5 | 11.8 | 0.13     | --        | 3.93         | 2.67 | --             |              |
| 30     | Co.053  | 29.6      | 10     | 242        | 254       | 320    | 450      | 2.0    | 20          | 40.8    | 0.90       | 61.7          | 7.4  | 14.5 | 16.4 | 0.00     | --        | 3.62         | 2.63 | --             |              |
| 30     | Co.053  | 29.6      | 11     | 270        | 279       | 320    | 450      | 1.0    | 20          | 30.8    | 0.92       | 42.9          | 6.0  | 26.9 | 24.2 | 0.30     | --        | 5.68         | 4.28 | --             | Plug. Preht. |
|        |         |           |        |            |           |        |          |        |             |         |            |               |      |      |      |          |           |              |      |                |              |
| 31     | Co.055  | 15.0      | 1      | 23         | 39        | 240    | 450      | 2.0    | 20          | 30.03   | 1.46       | 23.7          | 3.73 | 70.2 | 2.3  | 0.61     | 0.81      | 0.90         | 0.60 | 20.3           |              |
| 31     | Co.055  | 15.0      | 2      | 71         | 87        | 220    | 450      | 2.0    | 20          | 9.1     | 0.44       | 10.6          | 2.53 | 85.7 | 1.1  | 0.61     | 0.85      | 2.89         | 1.80 | --             |              |
| 31     | Co.055  | 15.0      | 3      | 98         | 110       | 240    | 450      | 2.0    | 20          | 25.8    | 1.26       | 23.9          | 3.94 | 70.1 | --   | 0.58     | --        | 1.06         | 0.70 | --             |              |
| 31     | Co.055  | 15.0      | 4      | 143        | 159       | 240    | 450      | 1.0    | 20          | 14.7    | 1.06       | 5.5           | 1.44 | 91.7 | 1.4  | 0.78     | 0.83      | 5.71         | 3.22 | --             |              |
| 31     | Co.055  | 15.0      | 5      | 196        | 207       | 240    | 600      | 1.0    | 20          | 16.1    | 1.16       | 4.7           | 1.21 | 92.8 | 1.3  | 0.80     | 0.83      | 6.17         | 3.11 | 33.6           |              |
| 31     | Co.055  | 15.0      | 6      | 222        | 234       | 240    | 450      | 2.0    | 20          | 29.1    | 1.42       | 18.0          | 2.84 | 77.8 | --   | 0.69     | --        | 1.40         | 0.91 | --             |              |
|        |         |           |        |            |           |        |          |        |             |         |            |               |      |      |      |          |           |              |      |                |              |
| 32     | Co.044  | 16.4      | 1      | 23         | 39        | 240    | 450      | 2.0    | 20          | 20.9    | 0.93       | 6.7           | 1.91 | 90.8 | 0.6  | 0.77     | 0.83      | 3.42         | 2.17 | 23.1           |              |
| 32     | Co.044  | 16.4      | 2      | 71         | 87        | 220    | 450      | 2.0    | 20          | 10.3    | 0.46       | 0.0           | 0.92 | 98.8 | 0.3  | 0.85     | --        | 4.33         | 4.50 | --             |              |
| 32     | Co.044  | 16.4      | 3      | 102        | 110       | 240    | 450      | 2.0    | 20          | 21.8    | 0.97       | 6.4           | 1.72 | 91.3 | --   | 0.79     | --        | 3.00         | 1.77 | --             |              |
| 32     | Co.044  | 16.4      | 4      | 143        | 159       | 240    | 450      | 1.0    | 20          | 9.87    | 0.25       | 2.1           | 3.19 | 92.5 | 2.2  | 0.61     | 0.87      | 7.33         | 4.00 | --             |              |
| 32     | Co.044  | 16.4      | 5      | 174        | 182       | 240    | 450      | 2.0    | 20          | 20.2    | 0.89       | 6.8           | 1.85 | 90.8 | --   | 0.79     | --        | 2.92         | 1.75 | --             |              |
|        |         |           |        |            |           |        |          |        |             |         |            |               |      |      |      |          |           |              |      |                |              |
| 33     | Co.053  | 31.4      | 1      | 24         | 39        | 240    | 450      | 2.0    | 20          | 41.4    | 0.94       | 23.2          | 3.1  | 69.6 | 4.1  | 0.65     | 0.76      | 0.82         | 0.58 | 21.7           | G.C. Calib   |
| 33     | Co.053  | 31.4      | 2      | 54         | 63        | 240    | 300      | 2.0    | 20          | 35.2    | 0.47       | 29.9          | 3.9  | 59.6 | 6.6  | 0.55     | --        | 0.89         | 0.70 | --             |              |
| 33     | Co.053  | 31.4      | 3      | 78         | 87        | 240    | 300      | 2.0    | 20          | 38.7    | 0.38       | 31.1          | 3.9  | 57.5 | 7.5  | 0.54     | --        | 0.97         | 0.71 | --             |              |
| 33     | Co.053  | 31.4      | 4      | 102        | 111       | 250    | 300      | 2.0    | 20          | 39.6    | 0.38       | 43.1          | 4.6  | 41.1 | 11.2 | 0.38     | --        | 0.99         | 0.77 | --             |              |
| 33     | Co.053  | 31.4      | 5      | 126        | 135       | 260    | 300      | 2.0    | 20          | 37.7    | 0.37       | 42.1          | 4.6  | 42.4 | 10.9 | 0.42     | --        | 1.76         | 1.21 | --             |              |
| 33     | Co.053  | 31.4      | 6      | 150        | 159       | 260    | 450      | 2.0    | 20          | 45.0    | 0.44       | 43.2          | 4.8  | 40.9 | 11.1 | 0.44     | --        | 1.35         | 0.95 | --             |              |
| 33     | Co.053  | 31.4      | 7      | 174        | 183       | 260    | 450      | 2.0    | 20          | 45.7    | 0.73       | 46.4          | 4.6  | 40.2 | 8.8  | 0.43     | --        | 1.06         | 0.77 | --             |              |
| 33     | Co.053  | 31.4      | 8      | 198        | 207       | 260    | 450      | 2.0    | 20          | 49.2    | 0.98       | 44.4          | 4.3  | 43.5 | 7.8  | 0.51     | --        | 0.87         | 0.65 | --             |              |
| 33     | Co.053  | 31.4      | 9      | 222        | 230       | 240    | 450      | 2.0    | 20          | 16.1    | 0.38       | 33.7          | 4.8  | 59.2 | 2.3  | 0.35     | --        | 3.14         | 1.91 | --             |              |

## Feed Gas Rates for Run 33

| Per No | N2 Sl/h | H2 Sl/h | CO Sl/h | Total Sl/h |
|--------|---------|---------|---------|------------|
| 1      | 563     | 225     | 112     | 900        |
| 2      | 338     | 135     | 67      | 540        |
| 3      | 250     | 100     | 50      | 400        |
| 4      | 250     | 100     | 50      | 400        |
| 5      | 250     | 100     | 50      | 400        |
| 6      | 250     | 100     | 50      | 400        |
| 7      | 160     | 160     | 80      | 400        |
| 8      | 100     | 200     | 100     | 400        |
| 9      | 563     | 225     | 112     | 900        |

Table I. SUMMARY OF SBCR RUN RESULTS (continued)

- a) Unless otherwise noted, total flow is ca. 15 L/min. STP, or 3 cm/sec linear gas flow.  
 b) Conversion is total CO conversion over the period (%).  
 c) Conversion and selectivities are calculated using N2 as an internal standard in the GC analysis of the offgas  
 d) Prod. rate: Rate for production of total hydrocarbons, C1+ (kg/kg cat..hr).  
 e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt,g | Per No | Time Start | Time Stop | Temp C | Pres psi | H2: CO | Synfl cc/hr | Conv. % | Prod. Rate | Selectivities |     |      |      | Alpha GC | Alpha Liq | fin/Paraffin |      | Olefins C6-18% | Comments   |
|--------|---------|-----------|--------|------------|-----------|--------|----------|--------|-------------|---------|------------|---------------|-----|------|------|----------|-----------|--------------|------|----------------|------------|
|        |         |           |        |            |           |        |          |        |             |         |            | %CH4          | %C2 | %C3+ | %CO2 |          |           | C3           | C4   |                |            |
| 34     | Co.060  | 15.6      | 1      | 23         | 32        | 240    | 450      | 2.0    | 20          | 31.4    | 1.46       | 14.0          | 2.3 | 82.2 | 1.5  | 0.75     | 0.79      | 1.61         | 1.00 | 23.1           | G.C. Calib |
| 34     | Co.060  | 15.6      | 2      | 71         | 87        | 220    | 450      | 2.0    | 20          | 13.0    | 0.60       | 0.1           | 1.8 | 97.8 | 0.3  | 0.81     | 0.88      | 4.00         | 2.83 | —              | G.C. Calib |
| 34     | Co.060  | 15.6      | 3      | 102        | 111       | 240    | 450      | 2.0    | 20          | 28.8    | 1.34       | 14.1          | 2.4 | 82.2 | 1.3  | 0.73     | —         | 1.87         | 1.17 | —              |            |
| 34     | Co.060  | 15.6      | 4      | 150        | 157       | 240    | 450      | 1.0    | 20          | 13.5    | 0.94       | 4.3           | 1.8 | 92.5 | 1.5  | 0.77     | 0.85      | 7.00         | 4.67 | —              |            |
| 34     | Co.060  | 15.6      | 5      | 191        | 207       | 240    | 600      | 1.0    | 20          | 12.8    | 0.89       | 2.2           | 1.6 | 94.9 | 1.3  | 0.82     | 0.86      | 6.60         | 4.33 | 38.5           | G.C. Calib |
| 34     | Co.060  | 15.6      | 6      | 222        | 230       | 240    | 450      | 2.0    | 20          | 24.9    | 1.16       | 13.8          | 2.8 | 82.2 | 1.2  | 0.74     | —         | 2.73         | 1.73 | —              |            |
| 35     | Co.041  | 26.0      | 1      | 23         | 39        | 240    | 450      | 2.0    | 20          | 35.7    | 1.00       | 13.6          | 2.1 | 82.9 | 1.4  | 0.79     | 0.82      | 1.09         | 0.74 | 18.2           |            |
| 35     | Co.041  | 26.0      | 2      | 54         | 63        | 250    | 450      | 2.0    | 20          | 42.1    | 1.17       | 27.3          | 4.6 | 64.4 | 3.7  | 0.65     | —         | 0.49         | 0.41 | —              | G.C. Calib |
| 35     | Co.041  | 26.0      | 3      | 78         | 87        | 260    | 450      | 2.0    | 20          | 45.1    | 1.24       | 41.7          | 6.8 | 44.9 | 6.6  | 0.51     | —         | 0.35         | 0.37 | —              |            |
| 35     | Co.041  | 26.0      | 4      | 102        | 111       | 260    | 450      | 2.0    | 20          | 46.7    | 0.77       | 39.1          | 4.6 | 49.9 | 6.5  | 0.56     | —         | 0.66         | 0.52 | —              |            |
| 35     | Co.041  | 26.0      | 5      | 126        | 135       | 260    | 450      | 2.0    | 20          | 49.6    | 0.61       | 39.4          | 4.0 | 49.6 | 7.0  | 0.57     | —         | 0.70         | 0.52 | —              |            |
| 35     | Co.041  | 26.0      | 6      | 150        | 159       | 260    | 450      | 2.0    | 20          | 47.9    | 0.95       | 33.1          | 3.9 | 58.7 | 4.3  | 0.64     | —         | 0.75         | 0.52 | —              |            |
| 35     | Co.041  | 26.0      | 7      | 174        | 183       | 260    | 450      | 2.0    | 20          | 49.7    | 1.24       | 30.9          | 4.4 | 61.3 | 3.4  | 0.66     | —         | 0.71         | 0.49 | —              |            |
| 35     | Co.041  | 26.0      | 8      | 198        | 206       | 240    | 450      | 2.0    | 20          | 19.6    | 0.55       | 17.3          | 2.6 | 79.1 | 1.0  | 0.71     | —         | 2.08         | 1.63 | —              |            |

## Feed Gas Rates for Run 35

| Per No | N2 Sl/h | H2 Sl/h | CO Sl/h | Total Sl/h |
|--------|---------|---------|---------|------------|
| 1      | 568     | 225     | 112     | 905        |
| 2      | 568     | 225     | 112     | 905        |
| 3      | 568     | 225     | 112     | 905        |
| 4      | 341     | 135     | 68      | 544        |
| 5      | 253     | 100     | 50      | 403        |
| 6      | 163     | 160     | 80      | 403        |
| 7      | 103     | 200     | 100     | 403        |
| 8      | 571     | 225     | 112     | 908        |

Table I. SUMMARY OF SBCR RUN RESULTS (continued)

- a) Unless otherwise noted, total flow is ca.15 L/min. STP, or 3 cm/sec linear gas flow.  
 b) Conversion is total CO conversion over the period (%).  
 c) Conversion and selectivities are calculated using N2 as an internal standard in the GC analysis of the offgas  
 d) Prod. rate: Rate for production of total hydrocarbons, C1+ (kg/kg cat., hr).  
 e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt,g | Per No | Time Start | Time Stop | Temp C | Pres psi | H2: CO | Synfl cc/hr | Conv. % | Prod. Rate | Selectivities |     |      |      | Alpha GC | Alpha Liq | fin/Paraffin |      | Olefins C6-18% | Comments   |
|--------|---------|-----------|--------|------------|-----------|--------|----------|--------|-------------|---------|------------|---------------|-----|------|------|----------|-----------|--------------|------|----------------|------------|
|        |         |           |        |            |           |        |          |        |             |         |            | %CH4          | %C2 | %C3+ | %CO2 |          |           | C3           | C4   |                |            |
| 36     | Co.032  | 15.9      | 1      | 23         | 39        | 240    | 450      | 2.0    | 20          | 24.0    | 1.10       | 9.1           | 1.8 | 88.2 | 0.83 | 0.77     | 0.83      | 3.23         | 2.00 | 25.2           |            |
| 36     | Co.032  | 15.9      | 2      | 71         | 87        | 220    | 450      | 2.0    | 20          | 7.7     | 0.35       | 0.0           | 1.5 | 97.8 | 0.77 | 0.81     | 0.91      | 4.00         | 3.33 | --             |            |
| 36     | Co.032  | 15.9      | 3      | 102        | 111       | 240    | 450      | 2.0    | 20          | 21.1    | 0.97       | 8.7           | 2.4 | 88.2 | 0.68 | 0.78     | --        | 3.08         | 1.86 | --             | G.C. Calib |
| 36     | Co.032  | 15.9      | 4      | 126        | 135       | 240    | 450      | 1.0    | 20          | 9.5     | 0.65       | 1.4           | 1.2 | 96.5 | 0.87 | 0.83     | --        | 7.67         | 4.50 | --             |            |
| 36     | Co.032  | 15.9      | 5      | 150        | 159       | 240    | 450      | 2.0    | 20          | 18.2    | 0.83       | 8.9           | 1.6 | 88.9 | 0.64 | 0.78     | --        | 3.36         | 2.36 | --             |            |
| 36     | Co.032  | 15.9      | 6      | 174        | 183       | 250    | 450      | 2.0    | 20          | 23.3    | 1.07       | 14.5          | 3.0 | 81.6 | 1.01 | 0.73     | --        | 2.29         | 1.48 | --             |            |
| 36     | Co.032  | 15.9      | 7      | 199        | 207       | 260    | 450      | 2.0    | 20          | 25.3    | 1.17       | 23.5          | 3.8 | 71.2 | 1.51 | 0.61     | --        | 1.76         | 1.15 | --             | G.C. Calib |
| 36     | Co.032  | 15.9      | 8      | 222        | 230       | 240    | 450      | 2.0    | 20          | 11.0    | 0.51       | 10.4          | 2.9 | 85.9 | 0.88 | 0.67     | --        | 3.33         | 2.33 | --             |            |
| 37     | Co.045  | 15.9      | 1      | 23         | 39        | 240    | 450      | 2.0    | 20          | 14.8    | 0.67       | 8.0           | 1.7 | 89.4 | 0.91 | 0.76     | 0.84      | 2.78         | 1.90 | 20.3           |            |
| 37     | Co.045  | 15.9      | 2      | 54         | 63        | 220    | 450      | 2.0    | 20          | 5.1     | 0.23       | 0.0           | 1.5 | 97.7 | 0.77 | 0.80     | 0.88      | 4.00         | 3.00 | --             |            |
| 37     | Co.045  | 15.9      | 3      | 78         | 87        | 240    | 450      | 2.0    | 20          | 13.8    | 0.63       | 8.2           | 1.9 | 89.0 | 0.89 | 0.76     | --        | 3.00         | 1.80 | --             |            |
| 37     | Co.045  | 15.9      | 4      | 102        | 111       | 240    | 450      | 1.0    | 20          | 6.5     | 0.44       | 0.1           | 1.4 | 97.3 | 1.16 | 0.82     | --        | 5.00         | 2.00 | --             |            |
| 37     | Co.045  | 15.9      | 5      | 126        | 135       | 240    | 450      | 2.0    | 20          | 13.4    | 0.61       | 0.6           | 1.8 | 88.9 | 0.80 | 0.79     | --        | 2.00         | 0.00 | --             |            |
| 37     | Co.045  | 15.9      | 6      | 150        | 159       | 250    | 450      | 2.0    | 20          | 19.6    | 0.91       | 17.5          | 2.5 | 80.0 | --   | 0.77     | --        | --           | 0.00 | --             | G.C. Calib |
| 37     | Co.045  | 15.9      | 7      | 174        | 183       | 260    | 450      | 2.0    | 20          | 27.4    | 1.26       | 30.1          | 5.2 | 62.2 | 2.49 | 0.61     | --        | 0.83         | 0.60 | --             |            |
| 37     | Co.045  | 15.9      | 8      | 198        | 207       | 240    | 450      | 2.0    | 20          | 13.7    | 0.63       | 9.3           | 1.7 | 87.4 | 0.78 | 0.75     | --        | 2.67         | 1.67 | --             |            |
| 38     | Co.058  | 15.9      | 1      | 23         | 39        | 240    | 450      | 2.0    | 20          | 28.0    | 1.28       | 11.9          | 2.1 | 85.1 | 0.91 | 0.75     | 0.85      | 1.88         | 1.17 | 22.4           |            |
| 38     | Co.058  | 15.9      | 2      | 47         | 63        | 220    | 450      | 2.0    | 20          | 11.7    | 0.54       | 1.4           | 1.4 | 96.9 | 0.38 | 0.81     | --        | 4.00         | 3.00 | --             |            |
| 38     | Co.058  | 15.9      | 3      | 74         | 88        | 240    | 450      | 2.0    | 20          | 12.7    | 0.87       | 3.2           | 1.3 | 94.5 | 1.01 | 0.81     | --        | 7.25         | 4.40 | --             |            |
| 38     | Co.058  | 15.9      | 4      | 96         | 111       | 240    | 450      | 2.0    | 20          | 26.4    | 1.21       | 11.9          | 2.2 | 85.0 | 0.87 | 0.74     | --        | 2.09         | 1.26 | --             |            |
| 39     | Co.064  | 15.9      | 1      | 23         | 39        | 240    | 450      | 2.0    | 20          | 34.2    | 1.56       | 13.6          | 2.3 | 82.6 | 1.55 | 0.73     | 0.85      | 1.40         | 0.92 | 21.0           | G.C. Calib |
| 39     | Co.064  | 15.9      | 2      | 47         | 62        | 220    | 450      | 2.0    | 20          | 15.0    | 0.68       | 4.6           | 1.2 | 93.8 | 0.44 | 0.78     | --        | 4.17         | 2.38 | --             |            |
| 39     | Co.064  | 15.9      | 3      | 71         | 87        | 240    | 450      | 2.0    | 20          | 15.9    | 1.09       | 4.7           | 1.2 | 92.9 | 1.28 | 0.80     | --        | 7.86         | 3.88 | --             |            |
| 39     | Co.064  | 15.9      | 4      | 95         | 111       | 240    | 450      | 2.0    | 20          | 33.1    | 1.52       | 15.7          | 2.6 | 80.3 | 1.52 | 0.72     | --        | 1.37         | 0.90 | --             |            |
| 40     | Co.063  | 15.0      | 1      | 23         | 40        | 240    | 450      | 2.0    | 20          | 8.7     | 0.43       | 6.5           | 0.9 | 92.6 | 0.09 | 0.74     | --        | 7.67         | 3.40 | 25.9           |            |
| 40     | Co.063  | 15.0      | 2      | 47         | 63        | 220    | 450      | 2.0    | 20          | 2.0     | 0.95       | 0.1           | 0.0 | 99.9 | 0.00 | 0.67     | --        | 7.00         | 7.00 | --             |            |
| 40     | Co.063  | 15.0      | 3      | 71         | 87        | 240    | 450      | 1.0    | 20          | 3.6     | 0.27       | 2.3           | 1.3 | 95.9 | 0.54 | 0.76     | --        | 13.00        | 5.50 | --             |            |
| 40     | Co.063  | 15.0      | 4      | 95         | 111       | 240    | 450      | 2.0    | 20          | 9.5     | 0.46       | 8.1           | 1.9 | 89.6 | 0.40 | 0.74     | --        | 4.80         | 3.17 | --             |            |
| 41     | Co.062  | 15.0      | 1      | 23         | 38        | 240    | 450      | 2.0    | 20          | 6.6     | 0.32       | 3.5           | 0.3 | 95.3 | 1.00 | 0.76     | 0.89      | 9.50         | 3.50 | 25.9           |            |
| 41     | Co.062  | 15.0      | 2      | 47         | 62        | 220    | 450      | 2.0    | 20          | 1.8     | 0.09       | 0.0           | 0.0 | 99.9 | 0.00 | 0.88     | --        | 4.00         | 5.00 | --             |            |
| 41     | Co.062  | 15.0      | 3      | 71         | 86        | 240    | 450      | 1.0    | 20          | 2.7     | 0.19       | 0.1           | 1.0 | 96.9 | 1.99 | 0.77     | --        | 10.00        | 4.00 | --             |            |
| 41     | Co.062  | 15.0      | 4      | 95         | 109       | 240    | 450      | 2.0    | 20          | 5.6     | 0.27       | 4.3           | 2.1 | 92.0 | 1.60 | 0.74     | --        | 5.70         | 4.00 | --             |            |
| 42     | Co.065  | 15.9      | 1      | 23         | 38        | 240    | 450      | 2.0    | 20          | 27.6    | 1.25       | 7.9           | 2.0 | 88.6 | 1.61 | 0.79     | 0.84      | 2.94         | 1.88 | 28.0           | G.C. Calib |
| 42     | Co.065  | 15.9      | 2      | 47         | 62        | 220    | 450      | 2.0    | 20          | 10.0    | 0.46       | 0.0           | 2.0 | 97.3 | 0.67 | 0.82     | --        | 5.33         | 3.25 | --             |            |
| 42     | Co.065  | 15.9      | 3      | 71         | 86        | 240    | 450      | 1.0    | 20          | 13.11   | 0.89       | 1.2           | 1.5 | 95.7 | 1.67 | 0.84     | --        | 7.00         | 5.50 | --             |            |
| 42     | Co.065  | 15.9      | 4      | 95         | 110       | 240    | 450      | 2.0    | 20          | 26.2    | 1.19       | 9.0           | 2.1 | 87.3 | 1.57 | 0.78     | --        | 3.06         | 2.13 | --             |            |
| 43     | CoW.12  | 9.1       | 1      | 23         | 38        | 240    | 450      | 2.0    | 20          | 6.1     | 0.47       | 20.3          | 6.1 | 66.3 | 7.29 | 0.61     | 0.83      | 3.63         | 2.33 | 11.9           |            |
| 43     | CoW.12  | 9.1       | 2      | 54         | 62        | 279    | 450      | 2.0    | 20          | 25.1    | 1.86       | 32.4          | 5.4 | 51.3 | 11.0 | 0.52     | --        | 1.62         | 1.12 | --             |            |

Table I. SUMMARY OF SBCR RUN RESULTS (continued)

- a) Unless otherwise noted, total flow is ca. 15 L/min, STP, or 3 cm/sec linear gas flow.  
 b) Conversion is total CO conversion over the period (%).  
 c) Conversion and selectivities are calculated using N2 as an internal standard in the GC analysis of the offgas  
 d) Prod. rate: Rate for production of total hydrocarbons, C1+ (kg/kg cat., hr).  
 e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt,g | Per No | Time Start | Time Stop | Temp C | Pres psi | H2: CO | Synfl cc/hr | Conv. % | Prod. Rate | Selectivities |      |      |      | Alpha GC | Alpha Liq | fin/Paraffin |       | Olefins |            | Comments |
|--------|---------|-----------|--------|------------|-----------|--------|----------|--------|-------------|---------|------------|---------------|------|------|------|----------|-----------|--------------|-------|---------|------------|----------|
|        |         |           |        |            |           |        |          |        |             |         |            | %CH4          | %C2  | %C3+ | %CO2 |          |           | C3           | C4    | C6-18%  |            |          |
| 44     | CoW.11  | 15.6      | 1      | 23         | 38        | 240    | 450      | 2.0    | 20          | 4.7     | 0.20       | 8.4           | 6.3  | 74.4 | 10.9 | 0.60     | --        | 5.40         | 3.50  | --      |            |          |
| 44     | CoW.11  | 15.6      | 2      | 47         | 62        | 260    | 450      | 2.0    | 20          | 12.7    | 0.51       | 18.6          | 6.1  | 59.8 | 15.4 | 0.56     | --        | 4.57         | 3.00  | --      |            |          |
| 44     | CoW.11  | 15.6      | 3      | 71         | 80        | 280    | 450      | 2.0    | 20          | 24.5    | 0.94       | 25.6          | 6.3  | 47.3 | 20.8 | 0.49     | --        | 3.38         | 2.29  | --      |            |          |
| 45     | Fe.01   | 15.9      | 1      | 23         | 38        | 240    | 450      | 2.0    | 20          | 3.4     | 0.14       | 0.0           | 7.5  | 84.8 | 7.7  | 0.72     | 0.77      | 2.80         | 1.50  | --      |            |          |
| 45     | Fe.01   | 15.9      | 2      | 71         | 62        | 280    | 450      | 2.0    | 20          | 14.5    | 0.55       | 17.2          | 8.8  | 54.0 | 19.9 | 0.54     | --        | 1.51         | 1.00  | --      |            |          |
| 45     | Fe.01   | 15.9      | 3      | 95         | 109       | 300    | 450      | 2.0    | 20          | 19.0    | 0.66       | 23.3          | 10.0 | 39.8 | 26.7 | 0.44     | 0.76      | 1.36         | 1.05  | 14.0    |            |          |
| 46     | CoW.05  | 15.7      | 1      | 23         | 38        | 240    | 450      | 2.0    | 20          | 4.9     | 0.23       | 10.9          | 6.5  | 81.9 | 0.74 | 0.60     | 0.78      | 3.11         | 2.14  | 13.3    |            |          |
| 46     | CoW.05  | 15.7      | 2      | 71         | 86        | 280    | 450      | 2.0    | 20          | 14.0    | 0.66       | 44.2          | 10.5 | 42.5 | 2.84 | 0.41     | 0.82      | 0.82         | 0.68  | 14.0    |            |          |
| 46     | CoW.05  | 15.7      | 3      | 95         | 110       | 300    | 450      | 2.0    | 20          | 19.4    | 0.89       | 54.4          | 11.  | 28.2 | 6.39 | 0.16     | 0.78      | 0.69         | 0.62  | 9.8     |            |          |
| 47     | Co.070  | 15.6      | 1      | 23         | 38        | 240    | 450      | 2.0    | 20          | 22.8    | 1.07       | 10.9          | 2.7  | 85.7 | 0.70 | 0.75     | 0.85      | 2.60         | 1.56  | 24.5    |            |          |
| 47     | Co.070  | 15.6      | 2      | 47         | 63        | 220    | 450      | 2.0    | 20          | 8.6     | 0.40       | 0.0           | 4.3  | 95.7 | 0.02 | 0.82     | --        | --           | --    | --      |            |          |
| 47     | Co.070  | 15.6      | 3      | 71         | 87        | 220    | 450      | 1.0    | 20          | 1.2     | 0.08       | 0.0           | --   | 94.5 | --   | 0.62     | --        | --           | --    | --      |            |          |
| 47     | Co.070  | 15.6      | 4      | 95         | 111       | 240    | 450      | 1.0    | 20          | 5.3     | 0.37       | 3.7           | 4.2  | 90.3 | 1.76 | 0.71     | --        | --           | --    | --      |            |          |
| 47     | Co.070  | 15.6      | 5      | 119        | 135       | 240    | 450      | 2.0    | 20          | 19.8    | 0.93       | 10.4          | 2.1  | 86.8 | 0.68 | 0.76     | --        | 2.85         | 1.71  | --      |            |          |
| 47     | Co.070  | 15.6      | 6      | 143        | 158       | 240    | 600      | 2.0    | 20          | 20.5    | 0.96       | 9.6           | 2.2  | 87.6 | 0.61 | 0.77     | --        | 2.36         | 1.40  | --      |            |          |
| 48     | Cow.13  | 15.5      | 1      | 23         | 38        | 240    | 450      | 2.0    | 20          | 8.5     | 0.39       | 10.9          | 8.1  | 76.9 | 4.30 | 0.74     | 0.89      | 4.00         | 3.00  | 21.0    | G.C. Calib |          |
| 48     | Cow.13  | 15.5      | 2      | 47         | 62        | 260    | 450      | 2.0    | 20          | 20.0    | 0.90       | 19.9          | 5.0  | 68.5 | 6.61 | 0.64     | --        | 2.56         | 1.74  | --      |            |          |
| 48     | Cow.13  | 15.5      | 3      | 71         | 86        | 279    | 450      | 2.0    | 20          | 25.73   | 1.11       | 34.5          | 6.0  | 48.1 | 11.4 | 0.48     | --        | 2.17         | 1.52  | --      |            |          |
| 48     | Cow.13  | 15.5      | 4      | 95         | 110       | 300    | 450      | 2.0    | 20          | 28.0    | 1.12       | 41.2          | 7.4  | 32.0 | 19.4 | 0.35     | --        | 2.22         | 1.61  | --      |            |          |
| 48     | Cow.13  | 15.5      | 5      | 117        | 133       | 240    | 450      | 2.0    | 20          | 2.62    | 0.12       | 12.3          | 18.6 | 62.9 | 6.2  | 0.66     | --        | 5.00         | 3.50  | --      |            |          |
| 49     | Co.068  | 15.5      | 1      | 23         | 39        | 242    | 450      | 2.0    | 20          | 26.7    | 1.26       | 18.9          | 4.6  | 75.3 | 1.19 | 0.68     | 0.77      | 0.52         | 0.34  | 20.3    |            |          |
| 49     | Co.068  | 15.5      | 2      | 47         | 62        | 259    | 450      | 2.0    | 20          | 34.5    | 1.62       | 35.3          | 6.4  | 55.0 | 3.38 | 0.54     | --        | 0.35         | 0.27  | --      |            |          |
| 49     | Co.068  | 15.5      | 3      | 71         | 86        | 278    | 450      | 2.0    | 20          | 34.6    | 1.61       | 53.2          | 7.5  | 33.0 | 6.30 | 0.34     | --        | 0.59         | 0.46  | --      |            |          |
| 49     | Co.068  | 15.5      | 4      | 102        | 110       | 299    | 450      | 2.0    | 20          | 28.4    | 1.31       | 63.2          | 8.4  | 20.3 | 8.11 | --       | --        | 1.07         | 0.81  | --      |            |          |
| 49     | Co.068  | 15.5      | 5      | 114        | 116       | 241    | 450      | 2.0    | 20          | 3.8     | 0.18       | 34.8          | 16.7 | 45.8 | 2.65 | 0.55     | --        | 2.57         | 1.60  | --      |            |          |
| 50     | Co.066  | 15.5      | 1      | 23         | 38        | 240    | 450      | 2.0    | 20          | 21.1    | 0.99       | 11.3          | 3.5  | 83.6 | 1.58 | 0.72     | 0.81      | 3.19         | 1.94  | --      |            |          |
| 50     | Co.066  | 15.5      | 2      | 47         | 62        | 260    | 450      | 2.0    | 20          | 36.1    | 1.66       | 21.6          | 4.2  | 70.1 | 4.09 | 0.64     | --        | 1.72         | 1.13  | --      |            |          |
| 50     | Co.066  | 15.5      | 3      | 71         | 86        | 279    | 450      | 2.0    | 20          | 36.9    | 1.66       | 37.6          | 6.2  | 48.1 | 8.10 | 0.47     | --        | 2.01         | 1.37  | --      |            |          |
| 50     | Co.066  | 15.5      | 4      | 95         | 110       | 299    | 450      | 2.0    | 20          | 31.1    | 1.35       | 40.7          | 7.9  | 39.7 | 11.7 | 0.37     | --        | 3.35         | 2.27  | --      |            |          |
| 50     | Co.066  | 15.5      | 5      | 119        | 133       | 239    | 450      | 2.0    | 20          | 3.7     | 0.17       | 15.1          | 17.0 | 64.6 | 3.31 | 0.67     | --        | 7.00         | 12.00 | --      |            |          |
| 60     | CAL.15  | 15        | 1      | 6          | 13        | 220    | 450      | 2.0    | 20          | 2.0     | 0.09       | -             | -    | 100  | -    | 0.84     | -         | -            | -     | --      | Soya Wax   |          |
| 61     | CAL.17  | 15        | 1      | 6          | 13        | 220    | 450      | 2.0    | 20          | 1.2     | 0.06       | -             | -    | 100  | -    | 0.80     | -         | -            | -     | --      | Soya Wax   |          |
| 62     | CAL.19  | 15        | 1      | 6          | 14        | 220    | 450      | 2.0    | 20          | 13.6    | 0.66       | 3.2           | -    | 96.0 | 0.81 | 0.88     | -         | -            | -     | --      |            |          |

Table II. M3 SBCR RUN RESULTS

## COMPARISON OF CATALYST ACTIVITY AT SIMILAR RUN CONDITIONS

| Period No. | Temperature | Pressure | H <sub>2</sub> /CO Ratio |
|------------|-------------|----------|--------------------------|
| 1          | 240 C       | 450psi   | 2.0                      |

a) Unless otherwise noted, total flow is ca.15 L/min. STP, or 3 cm/sec linear gas flow.

b) Conversion is total CO conversion over the period (%).

c) Conversion and selectivities are calculated using N<sub>2</sub> as an internal standard in the GC analysis of the

d) Prod. rate: Rate for production of total hydrocarbons, C<sub>1</sub>+ (kg/kg cat.,hr).

e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt,g | Conv. % | Prod. Rate | Selectivities |      |      |      | Alpha GC | Alpha Liq | Olefin/Paraffin |      | Olefins C6-18,% |
|--------|---------|-----------|---------|------------|---------------|------|------|------|----------|-----------|-----------------|------|-----------------|
|        |         |           |         |            | %CH4          | %C2  | %C3+ | CO   |          |           | C3              | C4   |                 |
| 5      | Co.003  | 15.1      | 31.7    | 1.53       | 16.7          | 2.4  | 79.8 | 1.2  | 0.71     | --        | 1.30            | 0.60 | 18.2            |
| 6      | Co.011  | 15.3      | 14.3    | 0.67       | 7.6           | 1.6  | 89.4 | 1.4  | 0.78     | 0.83      | 4.17            | 2.57 | 21.7            |
| 7      | Co.012  | 15.8      | 13.9    | 0.63       | 6.1           | 1.5  | 90.6 | 1.7  | 0.80     | 0.89      | 4.00            | 2.57 | 17.5            |
| 8      | Co.015  | 15.0      | 28.3    | 1.37       | 12.7          | 2.0  | 84.1 | 1.2  | 0.76     | 0.80      | 1.61            | 1.07 | 19.6            |
| 9      | Co.011  | 15.0      | 18.5    | 0.89       | 8.8           | 1.7  | 88.8 | 0.8  | 0.78     | 0.83      | 3.18            | 1.85 | 20.3            |
| 11     | Co.017  | 15.0      | 27.2    | 1.32       | 11.2          | 1.8  | 85.9 | 1.1  | 0.77     | 0.80      | 2.09            | 1.20 | 30.8            |
| 12     | Co.018  | 15.6      | 33.8    | 1.56       | 9.7           | 2.0  | 86.6 | 1.7  | 0.75     | 0.85      | 1.81            | 1.13 | 21.0            |
| 13     | Co.016  | 14.7      | 26.4    | 1.31       | (1)           | 1.7  | 89.3 | 0.7  | 0.78     | 0.81      | 2.00            | 1.41 | 21.7            |
| 14     | Co.019  | 15.2      | 13.9    | 0.66       | (2)           | 1.7  | 97.2 | 0.7  | 0.80     | 0.86      | 5.33            | 2.67 | 26.6            |
| 15     | Co.005  | 14.7      | 27.1    | 1.34       | 7.9           | 1.6  | 89.7 | 0.8  | 0.79     | 0.82      | 2.30            | 1.38 | 23.1            |
| 16     | Co.002  | 15.4      | 30.1    | 1.42       | 12.5          | 2.5  | 83.9 | 1.1  | 0.75     | 0.80      | 1.00            | 0.66 | 17.5            |
| 17     | Co.025  | 15.6      | 26.6    | 1.24       | 10.7          | 2.1  | 86.4 | 0.8  | 0.76     | 0.82      | 2.25            | 1.47 | 21.7            |
| 18     | Co.004  | 15.0      | 33.9    | 1.64       | 15.3          | 2.4  | 80.9 | 1.4  | 0.74     | 0.79      | 1.17            | 0.78 | 20.3            |
| 19     | Co.021  | 15.6      | 23.2    | 1.08       | 9.4           | 2.0  | 88.0 | 0.7  | 0.77     | 0.82      | 2.56            | 1.54 | 20.3            |
| 20     | Co.041  | 15.8      | 25.3    | 1.16       | 11.0          | 2.1  | 86.0 | 0.9  | 0.76     | 0.84      | 2.94            | 1.61 | 20.3            |
| 21     | Co.014  | 15.1      | 8.5     | 0.40       | 8.3           | 3.5  | 85.8 | 2.4  | 0.74     | 0.83      | 2.75            | 1.67 | 17.5            |
| 22     | Co.040  | 14.5      | 1.8     | 0.09       | 0.0           | 4.0  | 94.1 | 1.9  | 0.71     | 0.82      | 2.50            | 2.00 | --              |
| 23     | Co.047  | 15.8      | 28.2    | 1.29       | 7.7           | 1.5  | 89.3 | 1.5  | 0.79     | 0.84      | 3.14            | 1.69 | 24.5            |
| 24     | Co.049  | 15.6      | 30.6    | 1.41       | 10.9          | 1.8  | 85.7 | 1.7  | 0.76     | 0.82      | 2.09            | 1.30 | 14.0            |
| 25     | Co.047  | 15.6      | 28.1    | 1.30       | 8.8           | 1.6  | 88.1 | 1.5  | 0.78     | 0.85      | 2.93            | 1.88 | 25.9            |
| 26     | Co.031  | 15.9      | 30.9    | 1.41       | 12.1          | 1.9  | 84.9 | 1.1  | 0.75     | 0.83      | 1.83            | 1.14 | 22.4            |
| 27     | Co.029  | 15.9      | 28.3    | 1.27       | 8.3           | 1.6  | 87.9 | 2.2  | 0.77     | 0.84      | 3.40            | 2.20 | 27.3            |
| 28     | CoW.01  | 15.0      | 1.1     | 0.05       | 0.0           | 12.9 | 83.9 | 4.2  | 0.58     | --        | 3.33            | 2.50 | --              |
| 29     | Co.053  | 25.2      | 42.0    | 1.19       | 15.8          | 2.3  | 79.5 | 2.4  | 0.73     | --        | 1.00            | 0.67 | 17.5            |
| 30     | Co.053  | 29.6      | 41.8    | 1.02       | 22.6          | 2.9  | 71.5 | 3.1  | 0.66     | 0.77      | 0.99            | 0.65 | 19.6            |
| 31     | Co.055  | 15.0      | 30.0    | 1.46       | 23.7          | 3.7  | 70.2 | 2.3  | 0.61     | 0.81      | 0.90            | 0.60 | 20.3            |
| 32     | Co.044  | 16.4      | 20.9    | 0.93       | 6.7           | 1.9  | 90.8 | 0.6  | 0.77     | 0.83      | 3.42            | 2.17 | 23.1            |
| 33     | Co.053  | 31.4      | 41.4    | 0.94       | 23.2          | 3.1  | 69.6 | 4.1  | 0.65     | 0.76      | 0.82            | 0.58 | 21.7            |
| 34     | Co.060  | 15.6      | 31.4    | 1.46       | 14.0          | 2.3  | 82.2 | 1.5  | 0.75     | 0.79      | 1.61            | 1.00 | 23.1            |
| 35     | Co.041  | 26.0      | 35.7    | 1.00       | 13.6          | 2.1  | 82.9 | 1.4  | 0.79     | 0.76      | 1.09            | 0.74 | 18.2            |
| 36     | Co.032  | 15.9      | 24.0    | 1.10       | 9.1           | 1.8  | 88.2 | 0.8  | 0.77     | 0.83      | 3.23            | 2.00 | 25.2            |
| 37     | Co.045  | 15.9      | 14.8    | 0.67       | 8.0           | 1.7  | 89.4 | 0.9  | 0.76     | 0.84      | 2.78            | 1.90 | 20.3            |
| 38     | Co.058  | 15.9      | 28.0    | 1.28       | 11.9          | 2.1  | 85.1 | 0.9  | 0.75     | 0.85      | 1.88            | 1.17 | 22.4            |
| 39     | Co.064  | 15.9      | 34.2    | 1.56       | 13.6          | 2.3  | 82.6 | 1.6  | 0.73     | 0.85      | 1.40            | 0.92 | 21.0            |
| 40     | Co.063  | 15.0      | 8.7     | 0.43       | 6.5           | 0.9  | 92.6 | 0.1  | 0.74     | --        | 7.67            | 3.40 | 25.9            |
| 41     | Co.062  | 15.0      | 6.6     | 0.32       | 3.5           | 0.3  | 95.3 | 1.0  | 0.76     | 0.89      | 9.50            | 3.50 | 25.9            |
| 42     | Co.065  | 15.9      | 27.6    | 1.25       | 7.9           | 2.0  | 88.6 | 1.6  | 0.79     | 0.84      | 2.94            | 1.88 | 28.0            |
| 43     | CoW.12  | 9.1       | 6.1     | 0.47       | 20.3          | 6.1  | 66.3 | 7.3  | 0.61     | 0.83      | 3.63            | 2.33 | 11.9            |
| 44     | CoW.11  | 15.6      | 4.7     | 0.20       | 8.4           | 6.3  | 74.4 | 10.9 | 0.60     | --        | 5.40            | 3.50 | --              |
| 45     | Fe.01   | 15.9      | 3.4     | 0.14       | 0.0           | 7.5  | 84.8 | 7.7  | 0.71     | 0.77      | 2.80            | 1.50 | --              |
| 46     | CoW.05  | 15.7      | 4.9     | 0.23       | 10.9          | 6.5  | 81.9 | 0.7  | 0.60     | 0.78      | 3.11            | 2.14 | 13.3            |
| 47     | Co.070  | 15.6      | 22.8    | 1.07       | 10.9          | 2.7  | 85.7 | 0.7  | 0.75     | 0.85      | 2.60            | 1.56 | 24.5            |
| 48     | CoW.13  | 15.5      | 8.5     | 0.39       | 10.9          | 8.1  | 76.9 | 4.3  | 0.74     | 0.89      | 4.00            | 3.00 | 21.0            |
| 49     | Co.068  | 15.5      | 26.7    | 1.26       | 18.9          | 4.6  | 75.3 | 1.2  | 0.68     | 0.77      | 0.52            | 0.34 | 20.3            |
| 50     | Co.066  | 15.5      | 21.1    | 0.99       | 11.3          | 3.5  | 83.6 | 1.6  | 0.72     | 0.81      | 3.19            | 1.94 | --              |

Note Catalyst for Run 9 screened thru 170 x 400 mesh.

Catalysts For Runs 11 thru 20, and 23 thru 50 screened thru 150 x 400 mesh

Catalysts for Runs 21 and 22 screened thru 100 x 400 mesh.

(1) Weak TCD filaments in G.C. CH<sub>4</sub> peaks smaller than expected.

(2) Internal valve in G.C. leaked. CH<sub>4</sub> peak undetected.

Table III. M3 SBCR RUN RESULTS

## COMPARISON OF CATALYST ACTIVITY AT SIMILAR RUN CONDITIONS

| Period No. | Temperature | Pressure | H2/CO Ratio |
|------------|-------------|----------|-------------|
| 2          | 220 C       | 450psi   | 2.0         |

a) Unless otherwise noted, total flow is ca. 15 L/min. STP, or 3 cm/sec linear gas flow.

b) Conversion is total CO conversion over the period (%).

c) Conversion and selectivities are calculated using N2 as an internal standard in the GC analysis of the o

d) Prod. rate: Rate for production of total hydrocarbons, C1+ (kg/kg cat., hr).

e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt, g | Conv. % | Prod. Rate | Selectivities |     |       |      | Alpha GC | Alpha Liq | Olefin/Paraffin |      | Olefins C6-18, % |
|--------|---------|------------|---------|------------|---------------|-----|-------|------|----------|-----------|-----------------|------|------------------|
|        |         |            |         |            | %CH4          | %C2 | %C3+  | %CO2 |          |           | C3              | C4   |                  |
| 5      | Co.003  | 15.1       | 13.2    | 0.63       | 5.1           | 1.0 | 93.4  | 0.5  | 0.82     | 0.90      | 4.55            | 1.89 | --               |
| 6      | Co.011  | 15.3       | 5.1     | 0.23       | 0.0           | 0.0 | 97.2  | 2.8  | 0.87     | 0.82      | --              | --   | --               |
| 7      | Co.012  | 15.8       | 5.1     | 0.23       | 0.0           | 0.2 | 97.8  | 2.0  | 0.89     | 0.90      | --              | 2.50 | --               |
| 8      | Co.015  | 15.0       | 11.5    | 0.56       | 4.4           | 1.0 | 93.9  | 0.8  | 0.81     | 0.89      | 3.60            | 2.14 | --               |
| 9      | Co.011  | 15.0       | 6.3     | 0.31       | 0.0           | 1.0 | 98.6  | 0.4  | 0.88     | 0.93      | 12.00           | 1.80 | --               |
| 11     | Co.017  | 15.0       | 11.4    | 0.55       | 5.0           | 0.0 | 94.8  | 0.2  | 0.88     | 0.90      | 5.00            | 3.20 | --               |
| 12     | Co.018  | 15.6       | 12.6    | 0.59       | 2.8           | 0.0 | 97.1  | 0.1  | 0.90     | 0.88      | --              | --   | --               |
| 13     | Co.016  | 14.7       | 9.7     | 0.48       | (1)           | 0.1 | 99.9  | 0.0  | 0.91     | 0.88      | --              | --   | --               |
| 14     | Co.019  | 15.2       | 3.8     | 0.18       | (2)           | 1.7 | 96.7  | 1.6  | 0.88     | --        | --              | --   | --               |
| 15     | Co.005  | 14.7       | 10.7    | 0.53       | 0.0           | 0.9 | 98.4  | 0.7  | 0.83     | 0.88      | 4.25            | 3.25 | --               |
| 16     | Co.002  | 15.4       | 12.8    | 0.60       | 4.2           | 1.3 | 93.9  | 0.7  | 0.80     | 0.86      | 2.57            | 1.63 | --               |
| 17     | Co.025  | 15.6       | 8.4     | 0.39       | 0.0           | 1.1 | 96.9  | 1.9  | 0.82     | 0.92      | 6.50            | 3.00 | --               |
| 18     | Co.004  | 15.0       | 15.1    | 0.73       | 4.1           | 1.6 | 94.0  | 0.3  | 0.81     | 0.85      | 3.83            | 2.25 | --               |
| 19     | Co.021  | 15.6       | 8.3     | 0.38       | 0.0           | 1.3 | 98.2  | 0.5  | 0.82     | 0.88      | 4.33            | 3.33 | --               |
| 20     | Co.041  | 15.8       | 9.1     | 0.41       | 0.0           | 1.5 | 97.8  | 0.7  | 0.82     | 0.91      | 8.00            | 2.75 | --               |
| 21     | Co.014  | 15.1       | 3.2     | 0.15       | 0.0           | 2.3 | 85.8  | 4.3  | 0.76     | 0.86      | 3.50            | 3.00 | --               |
| 22     | Co.040  | 14.5       | 0.7     | 0.35       | 0.0           | 0.7 | 97.1  | 2.2  | 0.91     | --        | 1.00            | 2.00 | --               |
| 23     | Co.047  | 15.8       | --      | --         | (3)           | --  | --    | --   | --       | --        | --              | --   | --               |
| 24     | Co.049  | 15.6       | 12.0    | 1.07       | 2.7           | 0.9 | 95.3  | 1.1  | 0.81     | 0.95      | 4.25            | 3.25 | --               |
| 25     | Co.047  | 15.6       | 7.4     | 0.34       | 1.5           | 1.2 | 96.3  | 1.0  | 0.76     | 0.89      | 3.00            | 4.67 | --               |
| 26     | Co.031  | 15.9       | 13.6    | 0.62       | 3.9           | 0.9 | 94.6  | 0.5  | 0.80     | 0.85      | 4.20            | 2.67 | --               |
| 27     | Co.029  | 15.9       | 9.5     | 0.43       | 1.7           | 1.1 | 96.0  | 1.2  | 0.80     | 0.89      | 5.67            | 3.00 | --               |
| 29     | Co.053  | 25.2       | 20.5    | 0.59       | 5.7           | 4.8 | 89.0  | 0.5  | 0.79     | 0.84      | 3.38            | 2.10 | --               |
| 31     | Co.055  | 15.0       | 9.1     | 0.44       | 10.6          | 2.5 | 85.7  | 1.1  | 0.61     | 0.85      | 2.89            | 1.80 | --               |
| 32     | Co.044  | 16.4       | 10.3    | 0.46       | 0.0           | 0.9 | 98.8  | 0.3  | 0.85     | --        | 4.33            | 4.50 | --               |
| 34     | Co.060  | 15.6       | 13.0    | 0.60       | 0.1           | 1.8 | 97.8  | 0.4  | 0.81     | 0.88      | 4.00            | 2.83 | --               |
| 36     | Co.032  | 15.9       | 7.7     | 0.35       | 0.0           | 1.5 | 97.8  | 0.8  | 0.81     | 0.91      | 4.00            | 3.33 | --               |
| 37     | Co.045  | 15.9       | 5.1     | 0.23       | 0.0           | 1.5 | 97.7  | 0.8  | 0.80     | 0.88      | 4.00            | 3.00 | --               |
| 38     | Co.058  | 15.9       | 11.7    | 0.54       | 1.4           | 1.4 | 96.9  | 0.4  | 0.81     | --        | 4.00            | 3.00 | --               |
| 39     | Co.064  | 15.9       | 15.0    | 0.68       | 4.6           | 1.2 | 93.8  | 0.4  | 0.78     | --        | 4.17            | 2.38 | --               |
| 40     | Co.063  | 15.0       | 2.0     | 0.09       | 0.1           | 0.0 | 99.9  | 0.0  | 0.67     | --        | 7.00            | 7.00 | --               |
| 41     | Co.062  | 15.0       | 1.9     | 0.09       | 0.0           | 0.1 | 99.9  | 0.0  | 0.88     | --        | 4.00            | 5.00 | --               |
| 42     | Co.065  | 15.9       | 10.0    | 0.46       | 0.0           | 2.0 | 97.3  | 0.7  | 0.82     | --        | 5.33            | 3.25 | --               |
| 47     | Co.070  | 15.6       | 8.6     | 0.40       | 0.0           | 4.3 | 95.7  | 0.0  | 0.82     | --        | --              | --   | --               |
| 60     | CAL.15  | 15.0       | 2.0     | 0.09       | 0.0           | 0.0 | 100.0 | 0.0  | 0.84     | --        | --              | --   | --               |
| 61     | CAL.17  | 15.0       | 1.2     | 0.06       | 0.0           | 0.0 | 100.0 | 0.0  | 0.80     | --        | --              | --   | --               |
| 62     | CAL.19  | 15.0       | 13.6    | 0.66       | 3.2           | 0.0 | 99.5  | 0.8  | 0.88     | --        | --              | --   | --               |

Note Catalyst for Run 9 screened thru 170 x 400 mesh.

Catalysts For Runs 11 thru 20, and 23 thru 47 screened thru 150 x 400 mesh

Catalysts for Runs 21 and 22 screened thru 100 x 400 mesh.

(1) Weak TCD filaments in G.C. CH4 peaks smaller than expected.

(2) Internal valve in G.C. leaked. CH4 peak undetected.

(3) Replaced dual column restrictor valve.

Table IV. M3 SBCR RUN RESULTS

## COMPARISON OF CATALYST ACTIVITY AT SIMILAR RUN CONDITIONS

| Period No. | Temperature | Pressure | H2/CO Ratio |
|------------|-------------|----------|-------------|
| 4          | 240 C       | 450psi   | 1.0         |

a) Unless otherwise noted, total flow is ca.15 L/min. STP, or 3 cm/sec linear gas flow.

b) Conversion is total CO conversion over the period (%).

c) Conversion and selectivities are calculated using N2 as an internal standard in the GC analysis of the o

d) Prod. rate: Rate for production of total hydrocarbons, C1+ (kg/kg cat., hr).

e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt,g | Conv. % | Prod. Rate | Selectivities |     |      |      | Alpha GC | Alpha Liq | Olefin/Paraffin |      | Olefins C6-18,% |
|--------|---------|-----------|---------|------------|---------------|-----|------|------|----------|-----------|-----------------|------|-----------------|
|        |         |           |         |            | %CH4          | %C2 | %C3+ | %CO2 |          |           | C3              | C4   |                 |
| 5      | Co.003  | 15.1      | 13.1    | 0.95       | 4.2           | 1.2 | 93.3 | 1.2  | 0.83     | 0.88      | 6.67            | 3.70 | --              |
| 6      | Co.011  | 15.3      | 6.3     | 0.44       | 0.4           | 1.0 | 95.5 | 3.1  | 0.82     | 0.88      | --              | --   | --              |
| 7      | Co.012  | 15.8      | 3.9     | 0.26       | 4.8           | 2.3 | 86.3 | 6.6  | 0.70     | 0.85      | 16.00           | 3.50 | --              |
| 8      | Co.015  | 15.0      | 11.5    | 0.83       | 4.8           | 1.2 | 92.5 | 1.5  | 0.80     | 0.85      | 5.60            | 3.29 | --              |
| 9      | Co.011  | 15.0      | 8.0     | 0.58       | 1.3           | 1.3 | 96.3 | 1.2  | 0.82     | 0.87      | 7.00            | 2.83 | --              |
| 11     | Co.017  | 15.0      | 11.6    | 0.84       | 5.0           | 0.0 | 93.9 | 1.2  | 0.82     | 0.86      | 25.00           | 2.88 | --              |
| 12     | Co.018  | 15.6      | 12.4    | 0.86       | 3.3           | 0.0 | 95.0 | 1.7  | 0.80     | 0.86      | --              | --   | --              |
| 13     | Co.016  | 14.7      | 10.9    | 0.81       | (1)           | 0.8 | 97.7 | 0.3  | 0.84     | 0.86      | --              | --   | --              |
| 14     | Co.019  | 15.2      | --      | --         | (2)           | --  | --   | --   | 0.80     | --        | --              | --   | --              |
| 15     | Co.005  | 14.7      | 11.6    | 0.85       | 0.0           | 1.1 | 97.5 | 1.4  | 0.82     | 0.85      | 7.00            | 4.60 | --              |
| 16     | Co.002  | 15.4      | 12.6    | 0.89       | 4.4           | 1.6 | 92.8 | 1.2  | 0.79     | 0.84      | 4.43            | 2.88 | --              |
| 17     | Co.025  | 15.6      | 10.3    | 0.71       | 0.8           | 1.2 | 96.7 | 1.3  | 0.82     | 0.93      | 7.67            | 4.25 | --              |
| 18     | Co.004  | 15.0      | 14.7    | 1.06       | 4.1           | 1.2 | 93.2 | 1.4  | 0.80     | 0.83      | 6.17            | 3.75 | --              |
| 19     | Co.021  | 15.6      | 9.9     | 0.69       | 1.7           | 1.4 | 95.5 | 1.4  | 0.81     | 0.83      | 6.00            | 3.80 | --              |
| 20     | Co.041  | 15.8      | 12.7    | 0.88       | 1.9           | 1.2 | 95.9 | 1.0  | 0.83     | 0.86      | 9.00            | 4.20 | --              |
| 21     | Co.014  | 15.1      | 2.2     | 0.15       | 0.0           | 2.8 | 89.3 | 7.9  | 0.67     | 0.84      | 9.00            | 4.00 | --              |
| 23     | Co.047  | 15.8      | 11.9    | 0.81       | 2.9           | 0.9 | 94.1 | 2.1  | 0.82     | 0.88      | 7.33            | 4.75 | --              |
| 24     | Co.049  | 15.6      | 12.6    | 0.87       | 3.1           | 1.0 | 94.1 | 1.8  | 0.81     | 0.86      | 8.33            | 4.20 | --              |
| 25     | Co.047  | 15.6      | 10.8    | 0.75       | 3.0           | 1.0 | 94.2 | 1.8  | 0.81     | 0.90      | 8.00            | 4.75 | --              |
| 26     | Co.031  | 15.9      | 12.9    | 0.88       | 3.6           | 1.1 | 94.3 | 1.1  | 0.80     | 0.88      | 7.75            | 4.00 | --              |
| 27     | Co.029  | 15.9      | 12.0    | 0.82       | 1.9           | 0.9 | 95.4 | 1.9  | 0.83     | 0.90      | 8.33            | 4.75 | --              |
| 29     | Co.053  | 25.2      | 18.4    | 0.79       | 5.3           | 2.6 | 90.6 | 1.5  | 0.80     | 0.84      | 5.86            | 3.56 | --              |
| 31     | Co.055  | 15.0      | 14.7    | 1.06       | 5.5           | 1.4 | 91.7 | 1.4  | 0.78     | 0.83      | 5.71            | 3.22 | --              |
| 32     | Co.044  | 16.4      | 9.9     | 0.25       | 2.1           | 3.2 | 92.5 | 2.2  | 0.61     | 0.87      | 7.33            | 4.00 | --              |
| 34     | Co.060  | 15.6      | 13.5    | 0.94       | 4.3           | 1.8 | 92.5 | 1.5  | 0.77     | 0.85      | 7.00            | 4.67 | --              |
| 36     | Co.032  | 15.9      | 9.5     | 0.65       | 1.4           | 1.2 | 96.5 | 0.9  | 0.83     | --        | 7.67            | 4.50 | --              |
| 37     | Co.045  | 15.9      | 6.5     | 0.44       | 0.1           | 1.4 | 97.3 | 1.2  | 0.82     | --        | 5.00            | 2.00 | --              |
| 38     | Co.058  | 15.9      | 12.7    | 0.87       | 3.2           | 1.3 | 94.5 | 1.0  | 0.81     | --        | 7.25            | 4.40 | --              |
| 39     | Co.064  | 15.9      | 15.9    | 1.09       | 4.7           | 1.2 | 92.9 | 1.3  | 0.80     | --        | 7.86            | 3.88 | --              |
| 40     | Co.063  | 15.0      | 3.6     | 0.26       | 2.3           | 1.3 | 95.9 | 0.5  | 0.76     | --        | 13.00           | 5.50 | --              |
| 41     | Co.062  | 15.0      | 2.7     | 0.19       | 0.1           | 1.0 | 96.9 | 2.0  | 0.77     | --        | 10.00           | 4.00 | --              |
| 42     | Co.065  | 15.9      | 13.1    | 0.89       | 1.2           | 1.5 | 95.7 | 1.7  | 0.84     | --        | 7.00            | 5.50 | --              |
| 47     | Co.070  | 15.6      | 5.3     | 0.37       | 3.7           | 4.2 | 90.3 | 1.8  | 0.71     | --        | 2.85            | 1.71 | --              |

Note Catalyst for Run 9 screened thru 170 x 400 mesh.

Catalysts For Runs 11 thru 20, and 27 thru 47 screened thru 150 x 400 mesh

Catalysts for Runs 21 and 22 screened thru 100 x 400 mesh.

(1) Weak TCD filaments in G.C. CH4 peaks smaller than expected.

(2) Internal valve in G.C. leaked. CH4 peak undetected.



Table V. M3 SBCR RUN RESULTS

## COMPARISON OF CATALYST ACTIVITY AT SIMILAR RUN CONDITIONS

| Period No. | Temperature | Pressure | H <sub>2</sub> /CO Ratio |
|------------|-------------|----------|--------------------------|
| 5          | 240 C       | 600psi   | 1.0                      |

a) Unless otherwise noted, total flow is ca. 15 L/min. STP, or 3 cm/sec linear gas flow.

b) Conversion is total CO conversion over the period (%).

c) Conversion and selectivities are calculated using N<sub>2</sub> as an internal standard in the GC analysis of th

d) Prod. rate: Rate for production of total hydrocarbons, C<sub>1</sub>+ (kg/kg cat., hr).

e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt, g | Conv. % | Prod. Rate | Selectivities    |                 |                   |                  | Alpha GC | Alpha Liq | Olefin/Paraffin |                | Olefins C <sub>6</sub> -18, % |
|--------|---------|------------|---------|------------|------------------|-----------------|-------------------|------------------|----------|-----------|-----------------|----------------|-------------------------------|
|        |         |            |         |            | %CH <sub>4</sub> | %C <sub>2</sub> | %C <sub>3</sub> + | %CO <sub>2</sub> |          |           | C <sub>3</sub>  | C <sub>4</sub> |                               |
| 5      | Co.003  | 15.1       | 13.4    | 0.97       | 3.9              | 1.1             | 93.7              | 1.3              | 0.81     | --        | 5.26            | 3.45           | 30.1                          |
| 6      | Co.011  | 15.3       | 6.7     | 0.46       | 0.2              | 0.9             | 96.0              | 2.9              | 0.84     | 0.89      | 12.00           | 3.67           | 27.3                          |
| 7      | Co.012  | 15.8       | 4.3     | 0.28       | 0.1              | 2.1             | 91.6              | 6.3              | 0.75     | 0.82      | 8.50            | 3.50           | --                            |
| 8      | Co.015  | 15.0       | 12.4    | 0.90       | 4.9              | 0.8             | 93.6              | 0.7              | 0.84     | 0.85      | 5.20            | 3.14           | 30.8                          |
| 9      | Co.011  | 15.0       | 8.7     | 0.63       | 1.4              | 1.1             | 96.4              | 1.1              | 0.83     | 0.87      | 5.00            | 2.67           | 30.5                          |
| 11     | Co.017  | 15.0       | 11.6    | 0.84       | 4.2              | 0.0             | 94.7              | 1.2              | 0.86     | 0.86      | 24.00           | 1.63           | 21.0                          |
| 12     | Co.018  | 15.6       | 13.0    | 0.90       | 3.2              | 0.0             | 94.9              | 1.9              | 0.80     | 0.85      | --              | --             | 38.5                          |
| 13     | Co.016  | 14.7       | 11.4    | 0.85       | (1)              | 0.5             | 99.2              | 0.3              | 0.92     | 0.86      | --              | --             | 32.2                          |
| 14     | Co.019  | 15.2       | 5.9     | 0.41       | (2)              | 1.5             | 96.1              | 2.4              | 0.80     | --        | --              | --             | --                            |
| 15     | Co.005  | 14.7       | 23.0    | 0.90       | 0.0              | 1.0             | 97.7              | 1.3              | 0.83     | 0.85      | 7.00            | 4.40           | 36.4                          |
| 16     | Co.002  | 15.4       | 13.1    | 0.92       | 3.6              | 1.4             | 93.9              | 1.1              | 0.81     | 0.84      | 4.29            | 2.75           | 25.2                          |
| 17     | Co.025  | 15.6       | 19.9    | 0.81       | 9.3              | 1.1             | 96.5              | 1.1              | 0.83     | 0.88      | 8.00            | 4.25           | 32.9                          |
| 18     | Co.004  | 15.0       | 15.0    | 1.09       | 3.6              | 1.1             | 94.1              | 1.2              | 0.82     | 0.83      | 5.67            | 4.00           | 33.6                          |
| 19     | Co.021  | 15.6       | 11.5    | 0.80       | 1.8              | 1.2             | 95.8              | 1.2              | 0.83     | 0.85      | 6.50            | 3.80           | 30.8                          |
| 20     | Co.041  | 15.8       | 13.2    | 0.91       | 2.0              | 1.0             | 96.1              | 0.9              | 0.84     | 0.87      | 7.00            | 3.50           | 31.5                          |
| 21     | Co.014  | 15.1       | 2.1     | 0.15       | 0.0              | 2.6             | 94.8              | 2.7              | 0.71     | 0.81      | 4.50            | 3.50           | 23.1                          |
| 23     | Co.047  | 15.8       | 11.8    | 0.80       | 2.6              | 0.8             | 94.6              | 2.0              | 0.82     | 0.87      | 7.00            | 3.60           | 38.5                          |
| 24     | Co.049  | 15.6       | 13.4    | 0.92       | 2.6              | 0.9             | 94.8              | 1.7              | 0.82     | 0.88      | 8.33            | 4.20           | 37.8                          |
| 25     | Co.047  | 15.6       | 12.4    | 0.86       | 2.2              | 0.8             | 95.6              | 1.3              | 0.83     | 0.86      | 7.33            | 4.50           | 36.4                          |
| 26     | Co.031  | 15.9       | 13.9    | 0.95       | 3.5              | 1.0             | 94.4              | 1.1              | 0.81     | 0.85      | 6.80            | 3.71           | 30.1                          |
| 27     | Co.029  | 15.9       | 12.1    | 0.82       | 1.7              | 0.9             | 95.6              | 1.8              | 0.83     | 0.89      | 7.67            | 4.75           | 39.9                          |
| 29     | Co.053  | 25.2       | 19.7    | 0.85       | 4.6              | 1.2             | 92.9              | 1.3              | 0.82     | 0.85      | 5.71            | 3.44           | 33.6                          |
| 31     | Co.055  | 15.0       | 16.1    | 1.16       | 4.7              | 1.2             | 92.8              | 1.3              | 0.80     | 0.83      | 6.17            | 3.11           | 33.6                          |
| 34     | Co.060  | 15.6       | 12.8    | 0.89       | 2.2              | 1.6             | 94.9              | 1.2              | 0.82     | 0.86      | 6.60            | 4.33           | 38.5                          |

Note Catalyst for Run 9 screened thru 170 x 400 mesh.

Catalysts For Runs 11 thru 20, and 24 thru 34 screened thru 150 x 400 mesh

Catalyst for Runs 21 screened thru 100 x 400 mesh.

(1) Weak TCD filaments in G.C. CH<sub>4</sub> peaks smaller than expected.

(2) Internal valve in G.C. leaked. CH<sub>4</sub> peak undetected.

Table VI. SUMMARY OF M4 SBCR RUN RESULTS

- a) Unless otherwise noted, total flow is ca.15 L/min. STP, or 3 cm/sec linear gas flow.  
 b) Conversion is total CO conversion over the period (%).  
 c) Conversion and selectivities are calculated using N2 as an internal standard in the GC analysis of the offgas  
 d) Prod. rate: Rate for production of total hydrocarbons, C1+ (kg/kg cat., hr).  
 e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt,g | Per No | Time Start | Time Stop | Temp C | Pres psi | H2: CO | Synfl cc/hr | Conv. % | Prod. Rate | Selectivities |     |      |      | Alpha GC | Alpha Liq | Olefin/Paraffi |      | Olefins C6-18,% | Comments    |
|--------|---------|-----------|--------|------------|-----------|--------|----------|--------|-------------|---------|------------|---------------|-----|------|------|----------|-----------|----------------|------|-----------------|-------------|
| 3      | Co.002  | 15.2      | 1      | 25         | 35        | 240    | 450      | 2.0    | 20          | 29.4    | 1.42       | 17.3          | 2.3 | 79.4 | 1.01 | 0.73     | 0.82      | 0.91           | 0.60 | 17.5            |             |
| 3      | Co.002  | 15.2      | 2      | 73         | 83        | 220    | 450      | 2.0    | 20          | 11.8    | 0.56       | 4.7           | 1   | 93.7 | 0.59 | 0.81     | 0.90      | 2.71           | 1.63 | --              | G.C.Calib   |
| 3      | Co.002  | 15.2      | 3      | 97         | 107       | 240    | 450      | 2.0    | 20          | 26.4    | 1.28       | 16.0          | 3.1 | 80.1 | 0.88 | 0.73     | --        | 0.98           | 0.66 | --              |             |
| 3      | Co.002  | 15.2      | 4      | 145        | 155       | 240    | 450      | 1.0    | 20          | 11.6    | 0.83       | 3.9           | 2.4 | 92.8 | 0.84 | 0.81     | 0.87      | 4.29           | 3.14 | --              | G.C.Calib   |
| 3      | Co.002  | 15.2      | 5      | 182        | 203       | 240    | 600      | 1.0    | 20          | 12.9    | 0.92       | 4.0           | 1.5 | 93.5 | 0.91 | 0.81     | 0.82      | 4.29           | 2.75 | 24.5            |             |
| 3      | Co.002  | 15.2      | 6      | 217        | 226       | 240    | 450      | 2.0    | 20          | 24.2    | 1.17       | 17.1          | 3.1 | 79.0 | 0.83 | 0.71     | --        | 1.03           | 0.70 | --              |             |
| 4      | Co.024  | 15.4      | 1      | 20         | 37        | 240    | 450      | 2.0    | 20          | 25.5    | 1.21       | 8.6           | 2.0 | 89.0 | 0.43 | 0.79     | 0.84      | 2.93           | 1.93 | 21.7            |             |
| 4      | Co.024  | 15.4      | 2      | 68         | 85        | 220    | 450      | 2.0    | 0           | 9.5     | 0.45       | 0.0           | 2.1 | 97.6 | 0.27 | 0.83     | 0.91      | 5.33           | 4.00 | --              | No Synfl    |
| 4      | Co.024  | 15.4      | 3      | 92         | 109       | 240    | 450      | 2.0    | 0           | 23.7    | 1.13       | 9.5           | 2.1 | 88.0 | 0.45 | 0.77     | --        | 2.81           | 1.88 | --              |             |
| 4      | Co.024  | 15.4      | 4      | 140        | 157       | 240    | 450      | 1.0    | 0           | 10.3    | 0.73       | 0.5           | 1.6 | 97.2 | 0.71 | 0.83     | 0.87      | 8.33           | 4.75 | --              |             |
| 4      | Co.024  | 15.4      | 5      | 188        | 205       | 240    | 600      | 1.0    | 0           | 11.3    | 0.80       | 0.9           | 1.5 | 97.0 | 0.65 | 0.83     | 0.87      | 6.50           | 3.80 | 36.4            |             |
| 4      | Co.024  | 15.4      | 6      | 212        | 229       | 240    | 450      | 2.0    | 0           | 21.5    | 1.02       | 9.3           | 2.3 | 87.9 | 0.50 | 0.76     | --        | 2.93           | 2.07 | --              |             |
| 5      | Co.035  | 15.4      | 1      | 16         | 37        | 240    | 450      | 2.0    | 20          | 24.8    | 1.18       | 8.5           | 2.1 | 89.0 | 0.47 | 0.78     | 0.84      | 3.13           | 1.94 | 23.1            |             |
| 5      | Co.035  | 15.4      | 2      | 68         | 85        | 220    | 450      | 2.0    | 20          | 8.8     | 0.42       | 0.0           | 2.3 | 97.4 | 0.31 | 0.82     | --        | 5.33           | 4.00 | --              |             |
| 5      | Co.035  | 15.4      | 3      | 99         | 109       | 240    | 450      | 2.0    | 20          | 23.5    | 1.11       | 8.7           | 2.1 | 88.6 | 0.61 | 0.77     | --        | 3.07           | 1.94 | --              |             |
| 5      | Co.035  | 15.4      | 4      | 136        | 157       | 240    | 450      | 1.0    | 20          | 10.4    | 0.73       | 0.9           | 0.0 | 98.4 | 0.65 | --       | 0.83      | --             | --   | --              | G.C.Calib   |
| 5      | Co.035  | 15.4      | 5      | 184        | 205       | 240    | 600      | 1.0    | 20          | 10.7    | 0.76       | 0.7           | 1.4 | 97.1 | 0.75 | 0.84     | 0.88      | 6.25           | 4.50 | 27.3            |             |
| 5      | Co.035  | 15.4      | 6      | 212        | 228       | 240    | 450      | 2.0    | 20          | 19.4    | 0.92       | 7.8           | 2.3 | 89.4 | 0.56 | 0.79     | --        | 3.08           | 1.77 | --              |             |
| 6      | Co.028  | 15.4      | 1      | 23         | 40        | 240    | 450      | 2.0    | 20          | 21.2    | 1.00       | 6.1           | 1.6 | 91.3 | 1.01 | 0.81     | 0.83      | 4.86           | 3.00 | 28.7            |             |
| 6      | Co.028  | 15.4      | 2      | 67         | 88        | 220    | 450      | 2.0    | 20          | 6.6     | 0.31       | 0.0           | 1.9 | 97.4 | 0.72 | 0.83     | 0.90      | 5.50           | 4.00 | --              |             |
| 6      | Co.028  | 15.4      | 3      | 95         | 112       | 240    | 450      | 2.0    | 20          | 20.1    | 0.94       | 5.8           | 1.6 | 91.6 | 1.02 | 0.81     | --        | 4.25           | 2.67 | --              |             |
| 6      | Co.028  | 15.4      | 4      | 139        | 160       | 240    | 450      | 1.0    | 20          | 9.2     | 0.65       | 0.0           | 1.3 | 97.3 | 1.46 | 0.85     | 0.88      | 9.50           | 3.75 | --              |             |
| 6      | Co.028  | 15.4      | 5      | 189        | 208       | 240    | 600      | 1.0    | 20          | 9.5     | 0.67       | 0.0           | 1.1 | 97.5 | 1.36 | 0.85     | 0.88      | 6.00           | 3.50 | 40.6            |             |
| 6      | Co.028  | 15.4      | 6      | 213        | 232       | 240    | 450      | 2.0    | 20          | 18.0    | 0.84       | 5.7           | 1.6 | 91.5 | 1.12 | 0.80     | --        | 4.57           | 2.88 | --              |             |
| 7      | Co.043  | 15.4      | 1      | 18         | 39        | 240    | 450      | 2.0    | 20          | 13.0    | 0.61       | 3.7           | 1.8 | 93.4 | 1.06 | 0.79     | 0.85      | 5.60           | 3.17 | 27.3            |             |
| 7      | Co.043  | 15.4      | 2      | 53         | 63        | 220    | 450      | 2.0    | 20          | 4.3     | 0.20       | 0.0           | 1.4 | 96.3 | 2.25 | 0.81     | 0.91      | 4.00           | 3.00 | --              |             |
| 7      | Co.043  | 15.4      | 3      | 94         | 111       | 240    | 450      | 2.0    | 20          | 12.3    | 0.58       | 3.0           | 1.5 | 93.9 | 1.58 | 0.80     | --        | 5.00           | 2.83 | --              |             |
| 7      | Co.043  | 15.4      | 4      | 138        | 159       | 240    | 450      | 1.0    | 20          | 5.2     | 0.37       | 0.0           | 0.0 | 99.4 | 0.64 | 0.83     | 0.89      | 7.00           | 5.00 | --              |             |
| 7      | Co.043  | 15.4      | 5      | 191        | 207       | 240    | 600      | 1.0    | 20          | 5.9     | 0.41       | 0.0           | 2.2 | 94.8 | 2.99 | 0.82     | 0.89      | 6.00           | 3.75 | 30.1            | G.C.Calib   |
| 7      | Co.043  | 15.4      | 6      | 215        | 231       | 240    | 450      | 2.0    | 20          | 10.2    | 0.47       | 4.7           | 2.1 | 91.4 | 1.79 | 0.78     | --        | 5.50           | 3.20 | --              | Repair G.C. |
| 8      | Co.006  | 15.0      | 1      | 19         | 40        | 240    | 450      | 2.0    | 20          | 2.7     | 0.13       | 0.1           | 0.2 | 98.8 | 1.75 | 0.67     | 0.85      | 3.33           | 2.33 | 16.1            | Shut down   |
| 9      | Co.048  | 15.4      | 1      | 19         | 40        | 240    | 450      | 2.0    | 12          | 19.1    | 0.90       | 9.9           | 1.6 | 87.4 | 1.05 | 0.77     | 0.88      | 3.60           | 2.09 | 20.3            |             |
| 9      | Co.048  | 15.4      | 2      | 70         | 84        | 220    | 450      | 2.0    | 12          | 6.1     | 0.28       | 1.8           | 1   | 95.2 | 1.93 | 0.80     | 0.91      | 3.67           | 3.00 | --              |             |
| 9      | Co.048  | 15.4      | 3      | 93         | 111       | 240    | 450      | 2.0    | 20          | 17.8    | 0.84       | 10.1          | 1.7 | 86.9 | 1.33 | 0.77     | --        | 3.30           | 2.10 | --              |             |
| 9      | Co.048  | 15.4      | 4      | 139        | 159       | 240    | 450      | 1.0    | 20          | 8.2     | 0.57       | 2.3           | 1.0 | 93.8 | 2.98 | 0.82     | 0.90      | 8.50           | 4.33 | --              |             |
| 9      | Co.048  | 15.4      | 5      | 189        | 207       | 240    | 600      | 1.0    | 20          | 11.9    | 0.83       | 2.7           | 0.9 | 94.4 | 1.93 | 0.84     | 0.89      | 5.75           | 3.20 | 14.0            |             |
| 9      | Co.048  | 15.4      | 6      | 217        | 226       | 240    | 450      | 2.0    | 20          | 24.2    | 1.17       | 17.1          | 3.1 | 79.0 | 0.83 | 0.71     | --        | 1.03           | 0.70 | --              |             |

Table VI. SUMMARY OF M4 SBCR RUN RESULTS (continued)

- a) Unless otherwise noted, total flow is ca. 15 L/min. STP, or 3 cm/sec linear gas flow.  
 b) Conversion is total CO conversion over the period (%).  
 c) Conversion and selectivities are calculated using N2 as an internal standard in the GC analysis of the offgas  
 d) Prod. rate: Rate for production of total hydrocarbons, C1+ (kg/kg cat., hr).  
 e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt.g | Per No | Time Start | Time Stop | Temp C | Pres psi | H2: CO | Synfl cc/hr | Conv. % | Prod. Rate | Selectivities |     |      |      | Alpha GC | Alpha Liq | Olefin/Paraffi |      | Olefins C6-18, % | Comments  |
|--------|---------|-----------|--------|------------|-----------|--------|----------|--------|-------------|---------|------------|---------------|-----|------|------|----------|-----------|----------------|------|------------------|-----------|
|        |         |           |        |            |           |        |          |        |             |         |            | %CH4          | %C2 | %C3+ | %CO2 |          |           | C3             | C4   |                  |           |
| 10     | CAL.02  | 15.9      | 1      | 19         | 40        | 240    | 450      | 2.0    | 20          | 34.5    | 1.58       | 12.9          | 2.0 | 83.9 | 1.23 | 0.75     | 0.84      | 1.66           | 1.06 | 21.0             |           |
| 10     | CAL.02  | 15.9      | 2      | 69         | 88        | 220    | 450      | 2.0    | 20          | 14.9    | 0.68       | 4.6           | 0.9 | 94.0 | 0.47 | 0.81     | 0.88      | 4.40           | 2.29 | --               |           |
| 10     | CAL.02  | 15.9      | 3      | 91         | 112       | 240    | 450      | 2.0    | 20          | 34.2    | 1.57       | 12.6          | 2.0 | 84.4 | 1.00 | 0.75     | --        | 1.71           | 1.06 | --               |           |
| 10     | CAL.02  | 15.9      | 4      | 139        | 160       | 240    | 450      | 1.0    | 20          | 14.6    | 1.00       | 4.6           | 1.1 | 93.3 | 0.97 | 0.80     | 0.88      | 7.20           | 4.00 | --               |           |
| 10     | CAL.02  | 15.9      | 5      | 187        | 201       | 240    | 600      | 1.0    | 20          | 16.4    | 1.12       | 4.2           | 1.0 | 94.0 | 0.89 | 0.82     | 0.86      | 5.83           | 3.86 | 35.7             |           |
| 10     | CAL.02  | 15.9      | 6      | 215        | 230       | 240    | 450      | 2.0    | 20          | 30.9    | 1.42       | 13.3          | 2.1 | 83.7 | 0.90 | 0.74     | --        | 1.90           | 1.21 | --               |           |
| 11     | CAL.03  | 15.6      | 1      | 19         | 40        | 240    | 450      | 2.0    | 20          | 29.7    | 1.39       | 13.5          | 2.1 | 83.4 | 1.08 | 0.74     | 0.86      | 1.65           | 1.03 | 18.2             |           |
| 12     | Co.053  | 15.9      | 1      | 22         | 40        | 240    | 450      | 2.0    | 20          | 34.2    | 1.56       | 12.6          | 2.0 | 84.2 | 1.23 | 0.75     | 0.83      | 1.60           | 1.00 | 24.5             |           |
| 12     | Co.053  | 15.9      | 2      | 69         | 88        | 220    | 450      | 2.0    | 20          | 14.4    | 0.66       | 4.3           | 1.0 | 94.3 | 0.48 | 0.81     | 0.89      | 4.20           | 2.67 | --               |           |
| 12     | Co.053  | 15.9      | 3      | 93         | 112       | 240    | 450      | 2.0    | 20          | 34.0    | 1.56       | 13.4          | 2.2 | 83.2 | 1.21 | 0.74     | --        | 1.50           | 0.94 | --               |           |
| 12     | Co.053  | 15.9      | 4      | 150        | 152       | 240    | 450      | 1.0    | 20          | 13.3    | 0.91       | 4.3           | 1.2 | 93.3 | 1.18 | 0.80     | 0.89      | 6.60           | 3.71 | --               |           |
| 12     | Co.053  | 15.9      | 5      | 189        | 208       | 240    | 600      | 1.0    | 20          | 15.6    | 1.06       | 4.0           | 0.9 | 94.0 | 1.01 | 0.82     | 0.87      | 5.50           | 3.57 | 32.2             |           |
| 12     | Co.053  | 15.9      | 6      | 223        | 231       | 240    | 450      | 2.0    | 20          | 29.8    | 1.37       | 12.8          | 2.0 | 84.3 | 0.94 | 0.75     | --        | 1.89           | 1.10 | --               |           |
| 13     | Co.054  | 15.7      | 1      | 23         | 40        | 240    | 450      | 2.0    | 20          | 10.4    | 0.48       | 4.7           | 1.8 | 92.3 | 1.17 | 0.78     | 0.86      | 5.75           | 4.00 | 25.9             |           |
| 13     | Co.054  | 15.7      | 2      | 71         | 88        | 220    | 450      | 2.0    | 20          | 0.2     | 0.01       | 0.0           | 20  | 60.8 | 19.5 | 0.33     | 0.94      | 8.00           | 5.00 | --               |           |
| 13     | Co.054  | 15.7      | 3      | 102        | 112       | 240    | 450      | 2.0    | 20          | 10.6    | 0.49       | 4.5           | 1.5 | 92.8 | 1.23 | 0.79     | --        | 5.50           | 3.75 | --               |           |
| 13     | Co.054  | 15.7      | 4      | 143        | 160       | 240    | 450      | 1.0    | 20          | 5.2     | 0.36       | 0.0           | 1.2 | 97.0 | 1.85 | 0.83     | 0.95      | 6.00           | 4.50 | --               |           |
| 13     | Co.054  | 15.7      | 5      | 191        | 208       | 240    | 600      | 1.0    | 20          | 5.0     | 0.34       | 0.0           | 1.3 | 96.9 | 1.78 | 0.82     | 0.93      | 6.50           | 3.33 | 30.8             |           |
| 13     | Co.054  | 15.7      | 6      | 223        | 230       | 240    | 450      | 2.0    | 20          | 8.8     | 0.40       | 4.7           | 2.0 | 91.7 | 1.54 | 0.78     | --        | 5.00           | 3.50 | --               |           |
| 14     | BlendA  | 20.0      | 1      | 25         | 39        | 240    | 450      | 2.0    | 20          | 29.3    | 1.41       | 10.1          | 1.6 | 86.3 | 2.02 | 0.77     | 0.86      | 2.23           | 1.35 | 23.1             |           |
| 14     | BlendA  | 20.0      | 2      | 69         | 87        | 220    | 450      | 2.0    | 20          | 12.4    | 0.60       | 4.3           | 0.9 | 93.9 | 0.95 | 0.81     | 0.91      | 3.80           | 2.33 | --               |           |
| 14     | BlendA  | 20.0      | 3      | 93         | 111       | 240    | 450      | 2.0    | 20          | 27.5    | 1.33       | 10.5          | 1.7 | 86.4 | 1.44 | 0.76     | --        | 2.09           | 1.32 | --               |           |
| 14     | BlendA  | 20.0      | 4      | 143        | 158       | 240    | 450      | 1.0    | 20          | 12.7    | 0.91       | 3.4           | 1.0 | 94.0 | 1.61 | 0.81     | 0.86      | 7.50           | 3.83 | --               |           |
| 14     | BlendA  | 20.0      | 5      | 191        | 207       | 240    | 600      | 1.0    | 20          | 14.1    | 1.02       | 3.7           | 1.0 | 93.8 | 1.45 | 0.82     | 0.89      | 6.40           | 3.43 | 32.9             |           |
| 14     | BlendA  | 20.0      | 6      | 215        | 231       | 240    | 450      | 2.0    | 20          | 27.0    | 1.29       | 11.5          | 1.9 | 85.5 | 1.12 | 0.76     | --        | 2.04           | 1.30 | --               |           |
| 15     | Co.034  | 13.0      | 1      | 21         | 39        | 240    | 450      | 2.0    | 20          | 27.5    | 1.54       | 10.4          | 1.6 | 87.2 | 0.80 | 0.78     | 0.84      | 2.21           | 1.40 | 21.0             | G.C.Calib |
| 15     | Co.034  | 13.0      | 2      | 45         | 87        | 220    | 450      | 2.0    | 20          | 11.0    | 0.61       | 4.0           | 0.9 | 94.5 | 0.59 | 0.82     | 0.90      | 4.00           | 3.00 | --               |           |
| 15     | Co.034  | 13.0      | 3      | 95         | 111       | 240    | 450      | 2.0    | 20          | 26.6    | 1.49       | 11.5          | 1.9 | 85.9 | 0.82 | 0.76     | --        | 2.10           | 1.33 | --               |           |
| 15     | Co.034  | 13.0      | 4      | 141        | 159       | 240    | 450      | 1.0    | 20          | 11.2    | 0.94       | 3.9           | 1.0 | 94.0 | 1.02 | 0.82     | 0.87      | 8.33           | 4.00 | --               |           |
| 15     | Co.034  | 13.0      | 5      | 189        | 207       | 240    | 600      | 1.0    | 20          | 11.8    | 0.99       | 3.9           | 1.1 | 94.0 | 1.03 | 0.83     | --        | 5.75           | 3.80 | 37.8             |           |
| 15     | Co.034  | 13.0      | 6      | 215        | 231       | 240    | 450      | 2.0    | 20          | 21.6    | 1.19       | 10.9          | 1.9 | 86.3 | 0.87 | 0.76     | --        | 3.33           | 2.15 | --               |           |
| 16     | CAL.04  | 16.1      | 1      | 21         | 39        | 240    | 450      | 1.8    | 20          | 26.3    | 1.34       | 7.1           | 1.3 | 90.3 | 1.38 | 0.80     | 0.85      | 4.80           | 3.18 | 32.9             | H2/CO:    |
| 16     | CAL.04  | 16.1      | 2      | 54         | 163       | 220    | 450      | 1.8    | 20          | 8.4     | 0.42       | 2.6           | 1.0 | 94.1 | 2.31 | 0.80     | 0.88      | 5.00           | 4.00 | --               | 1.76/1.0  |
| 17     | CAL.08  | 15.0      | 1      | 21         | 39        | 240    | 450      | 1.8    | 20          | 16.9    | 0.93       | 5.9           | 1.0 | 91.7 | 1.36 | 0.82     | 0.88      | 5.20           | 3.33 | 28.7             | H2/CO:    |
| 17     | CAL.08  | 15.0      | 2      | 47         | 62        | 220    | 450      | 1.8    | 20          | 5.4     | 0.28       | 0.1           | 0.8 | 96.9 | 2.23 | 0.83     | --        | 4.00           | 3.00 | --               | 1.76/1.0  |
| 18     | CAL.07  | 15.0      | 1      | 21         | 39        | 240    | 450      | 2.0    | 20          | 20.6    | 1.03       | 7.7           | 1.2 | 90.0 | 1.09 | 0.81     | 0.88      | 5.00           | 3.00 | 32.2             |           |
| 18     | CAL.07  | 15.0      | 2      | 47         | 62        | 220    | 450      | 2.0    | 20          | 6.7     | 0.33       | 1.8           | 1.4 | 95.0 | 1.81 | 0.84     | --        | 4.00           | 3.00 | --               |           |

Table VI. SUMMARY OF M4 SBCR RUN RESULTS (continued)

- a) Unless otherwise noted, total flow is ca. 15 L/min. STP, or 3 cm/sec linear gas flow.  
 b) Conversion is total CO conversion over the period (%).  
 c) Conversion and selectivities are calculated using N2 as an internal standard in the GC analysis of the offgas  
 d) Prod. rate: Rate for production of total hydrocarbons, C1+ (kg/kg cat., hr).  
 e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt, g | Per No | Time Start | Time Stop | Temp C | Pres psi | H2: CO | Synfl cc/hr | Conv. % | Prod. Rate | Selectivities |     |      |      | Alpha GC | Alpha Liq | Olefin/Paraffi |      | Olefins C6-18, % | Comments    |
|--------|---------|------------|--------|------------|-----------|--------|----------|--------|-------------|---------|------------|---------------|-----|------|------|----------|-----------|----------------|------|------------------|-------------|
| 19     | CAL.05  | 15.7       | 1      | 23         | 39        | 240    | 450      | 2.0    | 20          | 26.6    | 1.22       | 7.3           | 1.3 | 90.2 | 1.19 | 0.82     | 0.86      | 4.11           | 2.70 | 18.2             | G.C. Calib  |
| 19     | CAL.05  | 15.7       | 2      | 47         | 62        | 220    | 450      | 2.0    | 20          | 9.0     | 0.41       | 2.3           | 1.4 | 94.8 | 1.56 | 0.84     | --        | 5.50           | 3.00 | --               |             |
| 20     | CAL.06  | 15.0       | 1      | 15         | 30        | 240    | 450      | 2.0    | 20          | 5.6     | 0.26       | 3.1           | 2.1 | 92.0 | 2.86 | 0.80     | 0.90      | 4.50           | 3.50 | 30.8             | G.C. Calib  |
| 20     | CAL.06  | 15.0       | 2      | 55         | 63        | 240    | 450      | 2.0    | 20          | 3.5     | 0.16       | 0.0           | 3.3 | 92.8 | 3.87 | 0.80     | 0.85      | 3.00           | 2.50 | --               |             |
| 20     | CAL.06  | 15.0       | 3      | 103        | 110       | 240    | 450      | 2.0    | 20          | 1.7     | 0.08       | 0.0           | 3.3 | 89.5 | 7.22 | 0.80     | --        | 1.50           | 3.00 | --               | Cat. Loss   |
| 21     | Co.004  | 15.9       | 1      | 23         | 40        | 240    | 450      | 2.0    | 20          | 39.3    | 1.80       | 15.2          | 2.3 | 81.2 | 1.38 | 0.74     | 0.89      | 1.16           | 0.73 | 23.1             |             |
| 21     | Co.004  | 15.9       | 2      | 71         | 88        | 220    | 450      | 2.0    | 20          | 16.1    | 0.74       | 8.1           | 1.2 | 90.2 | 0.48 | 0.78     | 0.87      | 3.38           | 2.22 | --               |             |
| 21     | Co.004  | 15.9       | 3      | 105        | 110       | 240    | 450      | 2.0    | 20          | 37.6    | 1.47       | 16.4          | 2.3 | 80.2 | 1.20 | 0.73     | --        | 1.10           | 0.70 | --               |             |
| 21     | Co.004  | 15.9       | 4      | 136        | 138       | 240    | 450      | 1.0    | 20          | 14.9    | 1.02       | 7.4           | 1.4 | 89.9 | 1.29 | 0.77     | 0.84      | 4.67           | 2.82 | --               |             |
| 21     | Co.004  | 15.9       | 5      | 166        | 184       | 240    | 600      | 1.0    | 20          | 18.4    | 1.26       | 6.1           | 1.1 | 91.9 | 0.94 | 0.81     | 0.84      | 5.25           | 2.91 | --               | G.C. Repair |
| 21     | Co.004  | 15.9       | 6      | 199        | 207       | 240    | 600      | 2.0    | 20          | 39.0    | 1.80       | 14.2          | 1.9 | 83.0 | 0.91 | 0.78     | 0.82      | 0.85           | 0.77 | --               |             |
| 21     | Co.004  | 15.9       | 7      | 212        | 214       | 240    | 450      | 2.0    | 20          | 34.6    | 1.59       | 15.8          | 2.3 | 81.0 | 1.00 | 0.76     | --        | 0.86           | 0.81 | --               | G.C. Repair |
| 22     | BlendB  | 30.5       | 1      | 23         | 39        | 240    | 450      | 2.0    | 20          | 35.6    | 1.64       | 12.7          | 1.6 | 79.4 | 6.29 | 0.75     | 0.81      | 1.40           | 0.81 | 27.3             |             |
| 22     | BlendB  | 30.5       | 2      | 78         | 87        | 240    | 450      | 1.0    | 20          | 15.8    | 1.07       | 1.5           | 0.9 | 90.5 | 7.06 | 0.80     | 0.83      | 5.00           | 2.22 | 38.5             | G.C. Calib  |
| 22     | BlendB  | 30.5       | 3      | 125        | 135       | 240    | 450      | 0.7    | 20          | 10.6    | 0.86       | 0.8           | 0.8 | 92.6 | 5.83 | 0.82     | 0.87      | 7.33           | 3.20 | 33.6             | G.C. Calib  |
| 22     | BlendB  | 30.5       | 4      | 150        | 158       | 240    | 450      | 1.0    | 20          | 14.1    | 0.99       | 3.9           | 1.0 | 91.0 | 4.07 | 0.80     | --        | 5.40           | 2.25 | --               |             |
| 22     | BlendB  | 30.5       | 5      | 174        | 183       | 240    | 450      | 2.0    | 20          | 30.1    | 1.44       | 13.2          | 1.8 | 82.4 | 2.56 | 0.75     | --        | 1.33           | 0.69 | --               |             |
| 22     | BlendB  | 30.5       | 6      | 191        | 207       | 260    | 450      | 1.0    | 20          | 23.5    | 1.63       | 10.0          | 1.9 | 82.1 | 6.02 | 0.74     | --        | 2.92           | 1.15 | --               |             |
| 22     | BlendB  | 30.5       | 7      | 223        | 232       | 280    | 450      | 1.0    | 20          | 26.9    | 1.79       | 17.8          | 3.1 | 68.4 | 10.7 | 0.64     | --        | 3.00           | 1.88 | --               |             |
| 22     | BlendB  | 30.5       | 8      | 247        | 255       | 280    | 450      | 0.7    | 20          | 17.1    | 1.34       | 8.8           | 2.6 | 78.8 | 9.8  | 0.70     | --        | 6.00           | 3.53 | --               |             |
| 23     | CAL.09  | 15.0       | 1      | 23         | 40        | 240    | 450      | 2.0    | 20          | 17.4    | 0.84       | 0.02          | 1.2 | 97.9 | 0.95 | 0.84     | 0.88      | 5.40           | 3.33 | 29.4             | G.C. Calib  |
| 23     | CAL.09  | 15.0       | 2      | 57         | 63        | 220    | 450      | 2.0    | 20          | 6.6     | 0.32       | 0.2           | 0.9 | 98.0 | 0.92 | 0.90     | --        | 4.00           | 3.00 | --               |             |

Table VI. SUMMARY OF M4 SBCR RUN RESULTS (continued)

- a) Unless otherwise noted, total flow is ca. 15 L/min. STP, or 3 cm/sec linear gas flow.  
 b) Conversion is total CO conversion over the period (%).  
 c) Conversion and selectivities are calculated using N2 as an internal standard in the GC analysis of the offgas  
 d) Prod. rate: Rate for production of total hydrocarbons, C1+ (kg/kg cat., hr).  
 e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt,g | Per No | Time Start | Time Stop | Temp C | Pres psi | H2: CO | Synfl cc/hr | Conv. % | Prod. Rate | Selectivities |     |      |      | Alpha GC | Alpha Liq | Olefin/Paraffi |      | Olefins C6-18.% | Comments  |
|--------|---------|-----------|--------|------------|-----------|--------|----------|--------|-------------|---------|------------|---------------|-----|------|------|----------|-----------|----------------|------|-----------------|-----------|
|        |         |           |        |            |           |        |          |        |             |         |            | %CH4          | %C2 | %C3+ | %CO2 |          |           | C3             | C4   |                 |           |
| 24     | Co.053  | 28.5      | 1      | 23         | 39        | 240    | 450      | 2.0    | 20          | 50.4    | 1.28       | 14.1          | 2.1 | 81.8 | 2.03 | 0.75     | 0.79      | 1.14           | 0.68 | --              | G.C.Calib |
| 24     | Co.053  | 28.5      | 2      | 54         | 63        | 250    | 450      | 2.0    | 20          | 53.5    | 1.34       | 24.2          | 3.6 | 67.9 | 4.24 | 0.66     | --        | 0.66           | 0.48 | --              |           |
| 24     | Co.053  | 28.5      | 3      | 78         | 87        | 260    | 450      | 2.0    | 30          | 55.3    | 1.36       | 38.2          | 5.2 | 49.0 | 7.64 | 0.53     | --        | 0.53           | 0.47 | --              |           |
| 24     | Co.053  | 28.5      | 4      | 102        | 110       | 260    | 450      | 2.0    | 30          | 52.8    | 2.13       | 29.1          | 4.0 | 62.1 | 4.79 | 0.64     | --        | 0.68           | 0.49 | --              |           |
| 24     | Co.053  | 28.5      | 5      | 126        | 135       | 260    | 450      | 2.0    | 30          | 58.9    | 1.90       | 28.5          | 3.9 | 62.8 | 4.90 | 0.65     | --        | 0.70           | 0.48 | --              |           |
| 24     | Co.053  | 28.5      | 6      | 146        | 158       | 260    | 450      | 2.0    | 30          | 42.6    | 1.74       | 26.9          | 3.8 | 66.3 | 2.96 | 0.65     | --        | 0.99           | 0.67 | --              |           |
| 24     | Co.053  | 28.5      | 7      | 175        | 182       | 260    | 450      | 2.0    | 30          | 51.5    | 1.31       | 31.6          | 4.5 | 60.0 | 3.90 | 0.60     | --        | 0.94           | 0.65 | --              |           |
| 24     | Co.053  | 28.5      | 8      | 199        | 208       | 260    | 450      | 2.0    | 30          | 58.1    | 1.89       | 27.6          | 3.7 | 65.1 | 3.67 | 0.66     | --        | 0.88           | 0.56 | --              |           |
| 24     | Co.053  | 28.5      | 9      | 218        | 231       | 260    | 450      | 2.0    | 30          | 62.9    | 2.05       | 23.2          | 3.0 | 70.6 | 3.20 | 0.71     | --        | 0.93           | 0.58 | --              |           |
| 24     | Co.053  | 28.5      | 10     | 259        | 263       | 275    | 450      | 2.0    | 30          | 72.1    | 2.24       | 39.1          | 5.0 | 46.4 | 9.53 | 0.57     | --        | 0.41           | 0.34 | --              |           |
| 24     | Co.053  | 28.5      | 11     | 290        | 304       | 260    | 450      | 2.0    | 30          | 48.8    | 1.62       | 29.0          | 3.8 | 65.4 | 1.83 | 0.65     | --        | 1.78           | 1.09 | --              |           |

## Feed Gas Rates for Run 24

| Per No | N2 Sl/h | H2 Sl/h | CO Sl/h | Total Sl/h |
|--------|---------|---------|---------|------------|
| 1      | 563     | 225     | 112     | 900        |
| 2      | 563     | 225     | 112     | 900        |
| 3      | 563     | 225     | 112     | 900        |
| 4      | 360     | 360     | 180     | 900        |
| 5      | 288     | 288     | 144     | 720        |
| 6      | 540     | 360     | 180     | 1080       |
| 7      | 563     | 225     | 112     | 900        |
| 8      | 200     | 288     | 144     | 632        |
| 9      | 108     | 288     | 144     | 540        |
| 10     | 108     | 288     | 144     | 540        |
| 11     | 108     | 288     | 144     | 540        |

Table VI. SUMMARY OF M4 SBCR RUN RESULTS (continued)

- a) Unless otherwise noted, total flow is ca. 15 L/min. STP, or 3 cm/sec linear gas flow.  
 b) Conversion is total CO conversion over the period (%).  
 c) Conversion and selectivities are calculated using N<sub>2</sub> as an internal standard in the GC analysis of the offgas.  
 d) Prod. rate: Rate for production of total hydrocarbons, C<sub>1</sub>+ (kg/kg cat.,hr).  
 e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt,g | Per No | Time Start | Time Stop | Temp C | Pres psi | H <sub>2</sub> : CO | Synfl cc/hr | Conv. % | Prod. Rate | Selectivities |     |      |      | Alpha GC | Alpha Liq | Olefin/Paraffi |      | Olefins C <sub>6</sub> -18,% | Comments |
|--------|---------|-----------|--------|------------|-----------|--------|----------|---------------------|-------------|---------|------------|---------------|-----|------|------|----------|-----------|----------------|------|------------------------------|----------|
| 25     | Co.056  | 15.0      | 1      | 23         | 39        | 240    | 450      | 2.0                 | 20          | 11.4    | 0.55       | 7.8           | 3.6 | 87.2 | 1.43 | 0.67     | 0.87      | 3.60           | 2.30 | 20.3                         |          |
| 25     | Co.056  | 15.0      | 2      | 47         | 63        | 220    | 450      | 2.0                 | 20          | 4.5     | 0.22       | 0.3           | 2.7 | 95.7 | 1.27 | 0.73     | --        | 4.67           | 3.00 | --                           |          |
| 26     | CAL.10  | 15.6      | 1      | 23         | 39        | 240    | 450      | 2.0                 | 20          | 21.9    | 1.01       | 5.4           | 1.5 | 91.9 | 1.25 | 0.79     | 0.85      | 3.60           | 2.27 | 25.9                         |          |
| 26     | CAL.10  | 15.6      | 2      | 54         | 63        | 240    | 450      | 2.0                 | 20          | 21.7    | 1.30       | 8.3           | 1.1 | 89.9 | 0.68 | 0.80     | --        | 3.78           | 2.45 | --                           |          |
| 26     | CAL.10  | 15.6      | 3      | 78         | 87        | 240    | 450      | 2.0                 | 20          | 17.2    | 1.04       | 11.7          | 1.4 | 86.1 | 0.78 | 0.76     | --        | 3.57           | 2.30 | --                           |          |
| 26     | CAL.10  | 15.6      | 4      | 102        | 111       | 240    | 450      | 2.0                 | 20          | 17.7    | 1.01       | 11.9          | 1.4 | 86.0 | 0.73 | 0.77     | --        | 3.52           | 2.28 | --                           |          |
| 26     | CAL.10  | 15.6      | 5      | 118        | 126       | 240    | 450      | 2.0                 | 20          | 16.2    | 0.75       | 4.9           | 1.7 | 92.3 | 1.10 | 0.77     | --        | 4.29           | 2.75 | --                           |          |

## Feed Gas Rates for Run 26

| Per No | N <sub>2</sub> SI/h | H <sub>2</sub> SI/h | CO SI/h | Total SI/h |
|--------|---------------------|---------------------|---------|------------|
| 1      | 563                 | 225                 | 112     | 900        |
| 2      | 108                 | 288                 | 144     | 540        |
| 3      | 54                  | 288                 | 144     | 486        |
| 4      | 25                  | 274                 | 137     | 436        |
| 5      | 563                 | 225                 | 112     | 900        |

Table VI. SUMMARY OF M4 SBCR RUN RESULTS (continued)

- a) Unless otherwise noted, total flow is ca. 15 L/min. STP, or 3 cm/sec linear gas flow.  
 b) Conversion is total CO conversion over the period (%).  
 c) Conversion and selectivities are calculated using N<sub>2</sub> as an internal standard in the GC analysis of the offgas  
 d) Prod. rate: Rate for production of total hydrocarbons, C<sub>1</sub>+ (kg/kg cat., hr).  
 e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt, g | Per No | Time Start | Time Stop | Temp C | Pres psi | H <sub>2</sub> : CO | Synfl cc/hr | Conv. % | Prod. Rate | Selectivities |     |      |      | Alpha GC | Alpha Liq | Olefin/Paraffi |      | Olefins C <sub>6</sub> -18, % | Comments    |
|--------|---------|------------|--------|------------|-----------|--------|----------|---------------------|-------------|---------|------------|---------------|-----|------|------|----------|-----------|----------------|------|-------------------------------|-------------|
| 27     | Co.050  | 14.6       | 1      | 23         | 39        | 240    | 450      | 2.0                 | 20          | 20.4    | 1.01       | 6.8           | 1.9 | 90.2 | 1.04 | 0.78     | 0.87      | 2.50           | 1.69 | 18.9                          |             |
| 27     | Co.050  | 14.6       | 2      | 78         | 87        | 220    | 450      | 2.0                 | 20          | 8.1     | 0.39       | 0.0           | 4.8 | 92.6 | 2.56 | 0.79     | 0.87      | 8.50           | 3.00 | --                            |             |
| 27     | Co.050  | 14.6       | 3      | 102        | 111       | 240    | 450      | 2.0                 | 20          | 19.8    | 0.98       | 9.1           | 2.6 | 87.0 | 1.30 | 0.76     | --        | 2.50           | 1.69 | --                            |             |
| 27     | Co.050  | 14.6       | 4      | 142        | 157       | 240    | 450      | 1.0                 | 20          | 8.4     | 0.61       | 1.1           | 2.9 | 93.3 | 2.78 | 0.79     | 0.90      | 6.25           | 5.00 | --                            |             |
| 27     | Co.050  | 14.6       | 5      | 173        | 182       | 240    | 450      | 2.0                 | 20          | 17.3    | 0.87       | 9.9           | 3.0 | 85.4 | 1.74 | 0.75     | --        | 2.50           | 1.75 | --                            |             |
| 28     | Co.057  | 15.8       | 1      | 23         | 40        | 240    | 450      | 2.0                 | 20          | 18.7    | 0.86       | 5.3           | 1.5 | 92.3 | 0.98 | 0.81     | 0.85      | 3.27           | 2.36 | 23.1                          |             |
| 28     | Co.057  | 15.8       | 2      | 71         | 88        | 220    | 450      | 2.0                 | 20          | 6.0     | 0.27       | 0.0           | 1.9 | 97.2 | 0.93 | 0.79     | --        | 5.50           | 4.00 | --                            | G.C. Repair |
| 28     | Co.057  | 15.8       | 3      | 102        | 112       | 240    | 450      | 2.0                 | 20          | 19.4    | 0.90       | 7.7           | 2.1 | 89.3 | 0.97 | 0.77     | --        | 3.70           | 2.27 | --                            |             |
| 28     | Co.057  | 15.8       | 4      | 126        | 135       | 240    | 450      | 1.0                 | 20          | 8.1     | 0.56       | 1.3           | 4.6 | 92.7 | 1.44 | 0.79     | --        | 7.33           | 5.67 | --                            |             |
| 28     | Co.057  | 15.8       | 5      | 150        | 159       | 240    | 450      | 2.0                 | 20          | 18.0    | 0.83       | 7.6           | 3.3 | 88.0 | 1.00 | 0.76     | --        | 3.89           | 2.30 | --                            |             |
| 28     | Co.057  | 15.8       | 6      | 175        | 184       | 250    | 450      | 2.0                 | 20          | 25.3    | 1.16       | 13.2          | 2.8 | 82.5 | 1.60 | 0.73     | --        | 2.30           | 1.45 | --                            |             |
| 28     | Co.057  | 15.8       | 7      | 198        | 208       | 260    | 450      | 2.0                 | 20          | 29.7    | 1.36       | 22.7          | 3.9 | 70.7 | 2.75 | 0.65     | --        | 1.39           | 0.92 | --                            |             |
| 28     | Co.057  | 15.8       | 8      | 222        | 231       | 240    | 450      | 2.0                 | 20          | 13.8    | 0.63       | 8.7           | 2.6 | 87.4 | 1.34 | 0.75     | --        | 3.11           | 2.11 | --                            |             |
| 29     | Co.061  | 45.4       | 1      | 39         | 41        | 240    | 450      | 2.0                 | 20          | 29.0    | 0.46       | 14.4          | 2.6 | 81.6 | 1.53 | 0.72     | 0.80      | 1.49           | 0.94 | 18.9                          | G.C. Calib  |
| 29     | Co.061  | 45.4       | 2      | 54         | 64        | 220    | 450      | 2.0                 | 20          | 11.8    | 0.19       | 3.9           | 1.9 | 93.5 | 0.73 | 0.77     | --        | 3.67           | 2.29 | --                            | Cat. Loss   |
| 29     | Co.061  | 45.4       | 3      | 78         | 86        | 240    | 450      | 2.0                 | 20          | 24.4    | 0.39       | 13.3          | 2.5 | 83.2 | 1.08 | 0.72     | --        | 1.67           | 1.08 | --                            | Cat. Loss   |
| 30     | Co.011  | 15.9       | 1      | 23         | 40        | 240    | 450      | 2.0                 | 20          | 8.0     | 0.36       | 5.8           | 3.9 | 87.8 | 2.49 | 0.71     | 0.89      | 5.75           | 3.00 | 22.4                          | G.C. Repair |
| 30     | Co.011  | 15.9       | 2      | 54         | 64        | 250    | 450      | 2.0                 | 20          | 15.8    | 0.72       | 10.0          | 3.0 | 84.8 | 2.28 | 0.74     | --        | 4.22           | 2.40 | --                            |             |
| 30     | Co.011  | 15.9       | 3      | 78         | 87        | 260    | 450      | 2.0                 | 20          | 23.6    | 1.06       | 18.1          | 3.7 | 74.5 | 3.72 | 0.67     | --        | 2.21           | 1.54 | --                            | G.C. Repair |
| 30     | Co.011  | 15.9       | 4      | 102        | 111       | 270    | 450      | 2.0                 | 20          | 28.3    | 1.26       | 26.5          | 3.4 | 64.9 | 5.23 | 0.60     | --        | 1.67           | 1.14 | --                            |             |
| 30     | Co.011  | 15.9       | 5      | 126        | 135       | 278    | 450      | 2.0                 | 20          | 28.5    | 1.27       | 34.5          | 4.0 | 55.1 | 6.43 | 0.53     | --        | 1.84           | 1.26 | --                            |             |
| 30     | Co.011  | 15.9       | 6      | 150        | 159       | 280    | 450      | 2.0                 | 20          | 36.0    | 0.95       | 40.3          | 4.5 | 47.9 | 7.32 | 0.48     | --        | 1.77           | 1.20 | --                            |             |
| 30     | Co.011  | 15.9       | 7      | 174        | 183       | 280    | 450      | 2.0                 | 20          | 38.5    | 0.77       | 43.7          | 4.7 | 43.7 | 7.90 | 0.45     | --        | 1.93           | 1.29 | --                            |             |
| 30     | Co.011  | 15.9       | 8      | 198        | 207       | 280    | 450      | 2.0                 | 20          | 36.0    | 1.15       | 38.5          | 4.5 | 50.9 | 6.07 | 0.52     | --        | 2.18           | 1.43 | --                            |             |
| 30     | Co.011  | 15.9       | 9      | 222        | 230       | 240    | 450      | 2.0                 | 20          | 4.4     | 0.20       | 6.9           | 4.0 | 85.5 | 3.63 | 0.66     | --        | 6.00           | 3.67 | --                            |             |

## Feed Gas Rates for Run 30

| Per No | N <sub>2</sub> SI/h | H <sub>2</sub> SI/h | CO SI/h | Total SI/h |
|--------|---------------------|---------------------|---------|------------|
| 1      | 558                 | 225                 | 112     | 895        |
| 2      | 558                 | 225                 | 112     | 895        |
| 3      | 558                 | 225                 | 112     | 895        |
| 4      | 558                 | 225                 | 112     | 895        |
| 5      | 558                 | 225                 | 112     | 895        |
| 6      | 338                 | 135                 | 67      | 540        |
| 7      | 250                 | 100                 | 50      | 400        |
| 8      | 160                 | 160                 | 80      | 400        |
| 9      | 558                 | 225                 | 112     | 895        |

Table VI. SUMMARY OF M4 SBCR RUN RESULTS (continued)

- a) Unless otherwise noted, total flow is ca. 15 L/min. STP, or 3 cm/sec linear gas flow.  
 b) Conversion is total CO conversion over the period (%).  
 c) Conversion and selectivities are calculated using N2 as an internal standard in the GC analysis of the offgas  
 d) Prod. rate: Rate for production of total hydrocarbons, C1+ (kg/kg cat. hr).  
 e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt,g | Per No | Time Start | Time Stop | Temp C | Pres psi | H2: CO | Synfl cc/hr | Conv. % | Prod. Rate | Selectivities |     |      |      | Alpha GC | Alpha Liq | Olefin/Paraffi |      | Olefins C6-18,% | Comments   |
|--------|---------|-----------|--------|------------|-----------|--------|----------|--------|-------------|---------|------------|---------------|-----|------|------|----------|-----------|----------------|------|-----------------|------------|
| 33     | CAL.13  | 15.9      | 1      | 23         | 39        | 241    | 450      | 2.0    | 20          | 28.1    | 1.28       | 6.4           | 1.4 | 90.9 | 1.29 | 0.81     | 0.85      | 3.64           | 2.15 | 23.8            |            |
| 33     | CAL.13  | 15.9      | 2      | 47         | 63        | 240    | 450      | 2.0    | 20          | 25.5    | 1.21       | 6.7           | 1.3 | 90.8 | 1.17 | 0.81     | --        | 3.80           | 2.45 | --              |            |
| 33     | CAL.13  | 15.9      | 3      | 71         | 87        | 240    | 450      | 2.0    | 20          | 25.8    | 1.18       | 6.8           | 1.3 | 90.8 | 1.14 | 0.80     | --        | 3.80           | 2.25 | --              |            |
| 33     | CAL.13  | 15.9      | 4      | 95         | 111       | 240    | 450      | 2.0    | 20          | 25.1    | 1.15       | 6.7           | 1.4 | 90.6 | 1.24 | 0.80     | --        | 4.33           | 2.55 | --              |            |
| 33     | CAL.13  | 15.9      | 5      | 119        | 135       | 238    | 450      | 2.0    | 20          | 22.4    | 1.02       | 5.7           | 1.4 | 91.8 | 1.14 | 0.80     | --        | 4.25           | 2.50 | --              |            |
| 33     | CAL.13  | 15.9      | 6      | 143        | 159       | 243    | 450      | 2.0    | 20          | 27.4    | 1.25       | 7.9           | 1.7 | 89.0 | 1.40 | 0.79     | --        | 3.54           | 2.13 | --              |            |
| 33     | CAL.13  | 15.9      | 7      | 162        | 178       | 240    | 450      | 2.0    | 20          | 23.8    | 1.09       | 6.4           | 1.5 | 91.0 | 1.13 | 0.80     | --        | 4.88           | 2.55 | --              |            |
| 33     | CAL.13  | 15.9      | 8      | 186        | 203       | 240    | 450      | 2.0    | 20          | 22.5    | 1.03       | 6.3           | 1.6 | 91.1 | 1.07 | 0.79     | --        | 4.50           | 2.60 | --              | G.C. Calib |
| 33     | CAL.13  | 15.9      | 9      | 210        | 231       | 241    | 450      | 2.0    | 20          | 23.2    | 1.06       | 6.7           | 1.6 | 90.5 | 1.12 | 0.81     | 0.86      | 4.22           | 2.45 | 25.2            |            |
| 33     | CAL.13  | 15.9      | 10     | 234        | 255       | 240    | 450      | 2.0    | 20          | 21.9    | 1.00       | 6.4           | 1.6 | 90.9 | 1.05 | 0.79     | --        | 4.50           | 2.78 | --              |            |
| 33     | CAL.13  | 15.9      | 11     | 262        | 279       | 240    | 450      | 2.0    | 20          | 21.9    | 1.00       | 6.3           | 1.6 | 91.1 | 1.02 | 0.80     | --        | 4.37           | 2.50 | --              |            |
| 33     | CAL.13  | 15.9      | 12     | 282        | 303       | 240    | 450      | 2.0    | 20          | 21.4    | 0.98       | 6.1           | 1.5 | 91.4 | 1.01 | 0.80     | --        | 4.25           | 2.78 | --              |            |
| 33     | CAL.13  | 15.9      | 13     | 306        | 327       | 240    | 450      | 2.0    | 20          | 20.1    | 0.92       | 5.9           | 1.6 | 91.5 | 1.05 | 0.80     | --        | 4.71           | 2.56 | --              |            |
| 33     | CAL.13  | 15.9      | 14     | 331        | 351       | 240    | 450      | 2.0    | 20          | 20.3    | 0.93       | 6.0           | 1.7 | 91.1 | 1.12 | 0.79     | --        | 4.13           | 2.67 | --              |            |
| 33     | CAL.13  | 15.9      | 15     | 360        | 373       | 240    | 450      | 2.0    | 20          | 18.5    | 0.85       | 7.2           | 1.5 | 90.3 | 0.98 | 0.80     | --        | 4.20           | 3.00 | --              | G.C. Calib |
| 33     | CAL.13  | 15.9      | 16     | 385        | 398       | 240    | 450      | 2.0    | 20          | 19.8    | 0.91       | 6.8           | 1.4 | 90.8 | 1.02 | 0.79     | 0.85      | 4.71           | 2.40 | 24.5            |            |
| 33     | CAL.13  | 15.9      | 17     | 402        | 423       | 240    | 450      | 2.0    | 20          | 18.4    | 0.84       | 7.5           | 1.6 | 89.9 | 1.09 | 0.78     | --        | 4.00           | 2.50 | --              |            |
| 33     | CAL.13  | 15.9      | 18     | 428        | 447       | 239    | 450      | 2.0    | 20          | 17.2    | 0.78       | 7.1           | 1.6 | 90.3 | 1.06 | 0.78     | --        | 4.43           | 2.88 | --              |            |
| 33     | CAL.13  | 15.9      | 19     | 510        | 519       | 241    | 450      | 2.0    | 20          | 15.6    | 0.71       | 6.9           | 1.5 | 90.6 | 1.11 | 0.78     | --        | 4.67           | 2.63 | --              | Down 48hr  |
| 33     | CAL.13  | 15.9      | 20     | 522        | 543       | 241    | 450      | 2.0    | 20          | 14.5    | 0.66       | 6.8           | 1.2 | 91.1 | 0.88 | 0.77     | --        | 4.50           | 3.00 | --              |            |
| 33     | CAL.13  | 15.9      | 21     | 546        | 567       | 240    | 450      | 2.0    | 20          | 13.9    | 0.64       | 6.9           | 1.2 | 91.1 | 0.76 | 0.77     | 0.88      | 5.40           | 3.00 | 26.6            |            |
| 33     | CAL.13  | 15.9      | 22     | 570        | 591       | 240    | 450      | 2.0    | 20          | 13.6    | 0.62       | 6.9           | 1.5 | 90.7 | 0.98 | 0.77     | --        | 5.40           | 3.00 | --              |            |
| 33     | CAL.13  | 15.9      | 23     | 596        | 614       | 240    | 450      | 2.0    | 20          | 14.1    | 0.64       | 7.0           | 1.5 | 90.6 | 0.95 | 0.77     | --        | 4.50           | 3.00 | --              |            |
| 33     | CAL.13  | 15.9      | 24     | 617        | 638       | 240    | 450      | 2.0    | 20          | 13.5    | 0.62       | 7.0           | 1.5 | 90.6 | 0.87 | 0.77     | --        | 5.40           | 2.86 | --              |            |
| 33     | CAL.13  | 15.9      | 25     | 641        | 662       | 240    | 450      | 2.0    | 20          | 13.1    | 0.60       | 7.1           | 1.5 | 90.5 | 0.86 | 0.76     | --        | 6.50           | 2.86 | --              |            |
| 33     | CAL.13  | 15.9      | 26     | 665        | 686       | 240    | 450      | 2.0    | 20          | 12.8    | 0.59       | 7.3           | 1.4 | 90.6 | 0.73 | 0.76     | --        | 5.20           | 2.86 | --              |            |
| 33     | CAL.13  | 15.9      | 27     | 689        | 710       | 240    | 450      | 2.0    | 20          | 12.6    | 0.58       | 7.2           | 1.4 | 90.5 | 0.86 | 0.76     | --        | 5.20           | 2.86 | --              |            |
| 33     | CAL.13  | 15.9      | 28     | 713        | 734       | 240    | 450      | 2.0    | 20          | 12.4    | 0.57       | 7.5           | 1.6 | 90.0 | 1.01 | 0.76     | 0.84      | 5.20           | 2.86 | 25.9            |            |
| 33     | CAL.13  | 15.9      | 29     | 737        | 758       | 240    | 450      | 2.0    | 20          | 12.4    | 0.57       | 7.6           | 1.5 | 90.2 | 0.74 | 0.76     | --        | 5.20           | 2.86 | --              |            |
| 33     | CAL.13  | 15.9      | 30     | 761        | 782       | 241    | 450      | 2.0    | 20          | 12.3    | 0.56       | 7.9           | 1.6 | 89.6 | 0.82 | 0.76     | --        | 5.20           | 3.00 | --              |            |
| 33     | CAL.13  | 15.9      | 31     | 785        | 806       | 241    | 450      | 2.0    | 20          | 12.3    | 0.56       | 7.8           | 0.7 | 90.9 | 0.52 | 0.76     | --        | 6.50           | 2.86 | --              |            |
| 33     | CAL.13  | 15.9      | 32     | 811        | 830       | 241    | 450      | 2.0    | 20          | 12.1    | 0.55       | 7.7           | 1.1 | 90.6 | 0.81 | 0.75     | --        | 6.50           | 2.86 | --              |            |
| 33     | CAL.13  | 15.9      | 33     | 833        | 854       | 240    | 450      | 2.0    | 20          | 11.7    | 0.54       | 7.7           | 1.5 | 90.1 | 0.74 | 0.75     | 0.84      | 5.20           | 2.86 | --              |            |
| 33     | CAL.13  | 15.9      | 34     | 857        | 878       | 241    | 450      | 2.0    | 20          | 11.8    | 0.54       | 8.0           | 0.6 | 91.0 | 0.50 | 0.76     | --        | 6.50           | 2.86 | --              |            |
| 33     | CAL.13  | 15.9      | 35     | 881        | 902       | 240    | 450      | 2.0    | 20          | 11.5    | 0.53       | 8.0           | 0.3 | 91.2 | 0.47 | 0.76     | --        | 6.50           | 2.86 | 25.9            |            |
| 33     | CAL.13  | 15.9      | 36     | 905        | 926       | 240    | 450      | 2.0    | 20          | 11.3    | 0.52       | 8.6           | 1.1 | 89.9 | 0.44 | 0.75     | 0.88      | 6.50           | 3.17 | --              |            |
| 33     | CAL.13  | 15.9      | 37     | 929        | 950       | 240    | 450      | 2.0    | 20          | 11.3    | 0.52       | 8.8           | 1.3 | 89.5 | 0.46 | 0.75     | --        | 6.50           | 3.17 | --              |            |
| 33     | CAL.13  | 15.9      | 38     | 953        | 974       | 240    | 450      | 2.0    | 20          | 11.3    | 0.52       | 9.2           | 1.6 | 88.4 | 0.81 | 0.74     | --        | 5.00           | 2.71 | --              |            |
| 33     | CAL.13  | 15.9      | 39     | 977        | 998       | 240    | 450      | 2.0    | 20          | 11.3    | 0.52       | 9.3           | 1.6 | 88.4 | 0.75 | 0.75     | --        | 5.00           | 3.33 | --              |            |
| 33     | CAL.13  | 15.9      | 40     | 1001       | 1022      | 241    | 450      | 2.0    | 20          | 10.8    | 0.49       | 10.2          | 0.8 | 88.4 | 0.52 | 0.74     | --        | 5.00           | 2.86 | --              |            |
| 33     | CAL.13  | 15.9      | 41     | 1031       | 1046      | 241    | 450      | 2.0    | 20          | 12.9    | 0.60       | 9.3           | 0.0 | 90.7 | 0.00 | 0.77     | --        | 5.40           | 3.00 | --              |            |
| 33     | CAL.13  | 15.9      | 42     | 1049       | 1069      | 240    | 450      | 2.0    | 20          | 11.2    | 0.52       | 9.4           | 0.6 | 89.6 | 0.37 | 0.75     | 0.86      | 5.50           | 2.86 | 22.4            |            |



Table VI. SUMMARY OF M4 SBCR RUN RESULTS (continued)

- a) Unless otherwise noted, total flow is ca. 15 L/min. STP, or 3 cm/sec linear gas flow.  
 b) Conversion is total CO conversion over the period (%).  
 c) Conversion and selectivities are calculated using N<sub>2</sub> as an internal standard in the GC analysis of the offgas  
 d) Prod. rate: Rate for production of total hydrocarbons, C<sub>1</sub>+ (kg/kg cat., hr).  
 e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt,g | Per No | Time Start | Time Stop | Temp C | Pres psi | H2: CO | Synfl cc/hr | Conv. % | Prod. Rate | Selectivities |     |      |      | Alpha GC | Alpha Liq | Olefin/Paraffi |       | Olefins C6-18.% | Comments    |
|--------|---------|-----------|--------|------------|-----------|--------|----------|--------|-------------|---------|------------|---------------|-----|------|------|----------|-----------|----------------|-------|-----------------|-------------|
|        |         |           |        |            |           |        |          |        |             |         |            | %CH4          | %C2 | %C3+ | %CO2 |          |           | C3             | C4    |                 |             |
| 37     | Co.005  | 25.0      | 1      | 1          | 18        | 216    | 450      | 2.0    | 20          | 8.1     | 0.23       | 0             | --  | --   | --   | --       | --        | --             | --    | --              |             |
| 37     | Co.005  | 25.0      | 2      | 20         | 38        | 221    | 450      | 2.0    | 20          | 12.6    | 0.36       | 1.5           | 3.9 | 93.9 | 0.71 | 0.90     | 0.89      | --             | --    | 26.6            |             |
| 37     | Co.005  | 25.0      | 3      | 41         | 62        | 221    | 450      | 2.0    | 20          | 14.4    | 0.42       | 2.9           | --  | 96.5 | 0.60 | 0.91     | --        | --             | --    | --              | Repair G.C. |
| 37     | Co.005  | 25.0      | 4      | 65         | 86        | 221    | 450      | 2.0    | 20          | 14.9    | 0.43       | 3.4           | 5.0 | 91.1 | 0.49 | 0.88     | --        | 6.33           | --    | --              |             |
| 37     | Co.005  | 25.0      | 5      | 89         | 110       | 221    | 450      | 2.0    | 20          | 14.4    | 0.42       | 3.6           | 9.0 | 86.8 | 0.60 | 0.85     | --        | 6.67           | 7.50  | --              |             |
| 37     | Co.005  | 25.0      | 6      | 113        | 134       | 221    | 450      | 2.0    | 20          | 14.1    | 0.41       | 3.8           | 8.0 | 87.7 | 0.58 | 0.85     | --        | 5.00           | 15.00 | --              |             |
| 37     | Co.005  | 25.0      | 7      | 137        | 158       | 222    | 450      | 2.0    | 20          | 14.8    | 0.43       | 4.4           | 6.6 | 88.5 | 0.55 | 0.82     | 0.90      | 5.50           | 3.20  | 23.1            |             |
| 37     | Co.005  | 25.0      | 8      | 165        | 182       | 221    | 450      | 2.0    | 20          | 14.1    | 0.41       | 4.3           | 5.3 | 89.9 | 0.50 | 0.80     | --        | 5.50           | 4.25  | --              |             |
| 37     | Co.005  | 25.0      | 9      | 185        | 206       | 220    | 450      | 2.0    | 20          | 13.3    | 0.39       | 3.9           | 3.6 | 92.0 | 0.53 | 0.79     | --        | 5.25           | 3.20  | --              |             |
| 37     | Co.005  | 25.0      | 10     | 209        | 230       | 221    | 450      | 2.0    | 20          | 13.6    | 0.39       | 5.1           | 3.2 | 91.3 | 0.51 | 0.78     | --        | 5.50           | 2.67  | --              |             |
| 37     | Co.005  | 25.0      | 11     | 233        | 254       | 221    | 450      | 2.0    | 20          | 13.5    | 0.39       | 4.7           | 3.6 | 91.2 | 0.48 | 0.78     | 0.89      | 4.60           | 3.20  | 22.4            |             |
| 37     | Co.005  | 25.0      | 12     | 257        | 278       | 221    | 450      | 2.0    | 20          | 13.3    | 0.39       | 4.5           | 3.1 | 91.9 | 0.49 | 0.78     | --        | 4.40           | 2.67  | --              |             |
| 37     | Co.005  | 25.0      | 13     | 281        | 302       | 221    | 450      | 2.0    | 20          | 13.1    | 0.38       | 4.7           | 3.3 | 91.5 | 0.49 | 0.78     | --        | 4.40           | 2.67  | --              |             |
| 37     | Co.005  | 25.0      | 14     | 305        | 326       | 221    | 450      | 2.0    | 20          | 12.7    | 0.37       | 4.9           | 4.1 | 90.5 | 0.52 | 0.78     | --        | 4.40           | 2.67  | --              |             |
| 37     | Co.005  | 25.0      | 15     | 329        | 350       | 221    | 450      | 2.0    | 20          | 12.4    | 0.36       | 4.9           | 3.9 | 90.6 | 0.54 | 0.77     | --        | 4.60           | 2.67  | --              |             |
| 37     | Co.005  | 25.0      | 16     | 353        | 374       | 221    | 450      | 2.0    | 0           | 12.5    | 0.36       | 5.2           | 3.8 | 90.5 | 0.54 | 0.77     | 0.83      | 4.60           | 2.67  | --              | Stop Syn FI |
| 37     | Co.005  | 25.0      | 17     | 377        | 397       | 221    | 450      | 2.0    | 0           | 12.5    | 0.36       | 5.1           | 3.3 | 90.9 | 0.56 | 0.77     | --        | 4.60           | 2.67  | --              |             |
| 37     | Co.005  | 25.0      | 18     | 401        | 422       | 221    | 450      | 2.0    | 0           | 12.9    | 0.37       | 5.3           | 3.9 | 90.4 | 0.42 | 0.77     | 0.87      | 4.80           | 2.83  | --              |             |
| 37     | Co.005  | 25.0      | 19     | 425        | 446       | 221    | 450      | 2.0    | 0           | 12.3    | 0.36       | 5.1           | 3.1 | 91.6 | 0.44 | 0.77     | --        | 4.60           | 2.83  | --              |             |
| 37     | Co.005  | 25.0      | 20     | 449        | 470       | 221    | 450      | 2.0    | 0           | 8.6     | 0.41       | 10.4          | 2.5 | 86.7 | 0.37 | 0.72     | --        | 4.14           | 2.63  | --              |             |
| 37     | Co.005  | 25.0      | 21     | 473        | 494       | 221    | 450      | 2.0    | 0           | 9.1     | 0.43       | 10.5          | 2.6 | 86.5 | 0.37 | 0.74     | --        | 4.43           | 2.63  | 25.2            |             |
| 37     | Co.005  | 25.0      | 22     | 497        | 518       | 221    | 450      | 2.0    | 0           | 8.9     | 0.42       | 10.8          | 2.8 | 85.9 | 0.45 | 0.73     | 0.86      | 4.43           | 2.63  | --              |             |
| 37     | Co.005  | 25.0      | 23     | 521        | 542       | 221    | 450      | 2.0    | 0           | 8.7     | 0.41       | 10.9          | 2.7 | 85.9 | 0.50 | 0.73     | --        | 4.43           | 2.63  | --              |             |
| 37     | Co.005  | 25.0      | 24     | 545        | 554       | 221    | 450      | 2.0    | 0           | 8.5     | 0.41       | 10.9          | 3.2 | 85.3 | 0.50 | 0.72     | --        | 4.43           | 3.00  | --              |             |
| 37     | Co.005  | 25.0      | 25     | 574        | 590       | 221    | 450      | 2.0    | 0           | 8.1     | 0.38       | 10.9          | 3.5 | 84.9 | 0.55 | 0.72     | --        | 4.29           | 2.86  | --              |             |
| 37     | Co.005  | 25.0      | 26     | 593        | 614       | 221    | 450      | 2.0    | 0           | 7.9     | 0.37       | 10.8          | 3.5 | 85.1 | 0.54 | 0.72     | --        | 4.14           | 2.86  | --              |             |
| 37     | Co.005  | 25.0      | 27     | 617        | 638       | 220    | 450      | 2.0    | 0           | 7.6     | 0.36       | 10.8          | 3.1 | 85.6 | 0.57 | 0.72     | 0.86      | 4.00           | 2.71  | --              |             |
| 37     | Co.005  | 25.0      | 28     | 641        | 662       | 220    | 450      | 2.0    | 0           | 7.6     | 0.36       | 10.8          | 2.6 | 85.9 | 0.54 | 0.72     | --        | 4.00           | 2.71  | --              |             |
| 37     | Co.005  | 25.0      | 29     | 674        | 686       | 221    | 450      | 1.5    | 0           | 5.6     | 0.32       | 8.4           | 2.6 | 88.2 | 0.78 | 0.73     | --        | 5.00           | 2.83  | --              |             |
| 37     | Co.005  | 25.0      | 30     | 698        | 710       | 221    | 450      | 1.5    | 0           | 4.8     | 0.29       | 10.3          | 3.0 | 85.9 | 0.81 | 0.71     | 0.85      | 5.00           | 3.40  | --              |             |
| 37     | Co.005  | 25.0      | 31     | 731        | 734       | 215    | 450      | 1.5    | 0           | 3.2     | 0.19       | 8.3           | 4.5 | 85.1 | 2.03 | 0.70     |           | 4.50           | 12.00 | --              |             |
| 37     | Co.005  | 25.0      | 32     | 742        | 758       | 221    | 450      | 1.5    | 20          | 5.6     | 0.35       | 8.6           | 3.1 | 87.6 | 0.71 | 0.75     |           | 4.80           | 3.20  | --              | Add Syn FI  |
| 37     | Co.005  | 25.0      | 33     | 774        | 782       | 220    | 450      | 2.0    | 20          | 10.4    | 0.31       | 4.7           | 3.0 | 91.6 | 0.70 | 0.75     |           | 4.40           | 2.50  | --              |             |
| 37     | Co.005  | 25.0      | 34     | 785        | 806       | 220    | 450      | 2.0    | 20          | 10.3    | 0.29       | 4.7           | 2.9 | 91.6 | 0.70 | 0.75     |           | 3.67           | 2.50  | --              |             |
| 37     | Co.005  | 25.0      | 35     | 813        | 830       | 220    | 450      | 1.5    | 20          | 4.5     | 0.28       | 9.7           | 3.3 | 86.2 | 0.82 | 0.72     |           | 4.60           | 3.20  | --              |             |

## Feed Gas Rates for Run 37

| Per No | N <sub>2</sub> SI/h | H <sub>2</sub> SI/h | CO SI/h | Total SI/h |
|--------|---------------------|---------------------|---------|------------|
| 1      | 563                 | 225                 | 112     | 900        |
| 20     | 360                 | 360                 | 180     | 900        |
| 29     | 360                 | 324                 | 216     | 900        |
| 30     | 300                 | 360                 | 240     | 900        |
| 33     | 563                 | 225                 | 112     | 900        |
| 35     | 300                 | 360                 | 240     | 900        |

Table VI. SUMMARY OF M4 SBCR RUN RESULTS (continued)

- a) Unless otherwise noted, total flow is ca. 15 L/min. STP. or 3 cm/sec linear gas flow.  
 b) Conversion is total CO conversion over the period (%).  
 c) Conversion and selectivities are calculated using N2 as an internal standard in the GC analysis of the offgas  
 d) Prod. rate: Rate for production of total hydrocarbons, C1+ (kg/kg cat., hr).  
 e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt.g | Per No | Time Start | Time Stop | Temp C | Pres psi | H2: CO | Synfl cc/hr | Conv. % | Prod. Rate | Selectivities |     |      |      | Alpha GC | Alpha Liq | Olefin/Paraffi |      | Olefins C6-18, % | Comments  |
|--------|---------|-----------|--------|------------|-----------|--------|----------|--------|-------------|---------|------------|---------------|-----|------|------|----------|-----------|----------------|------|------------------|-----------|
|        |         |           |        |            |           |        |          |        |             |         |            | %CH4          | %C2 | %C3+ | %CO2 |          |           | C3             | C4   |                  |           |
| 38     | CAL.14  | 15.0      | 1      | 17         | 25        | 240    | 450      | 2.0    | 20          | 25.5    | 1.23       | 6.2           | 1.8 | 91.0 | 1.04 | 0.79     | -         | 4.75           | 2.80 | --               | Shut Down |
| 42     | CAL.16  | 15.0      | 1      | 6          | 13        | 220    | 450      | 2.0    | 20          | <1.0    | 0.04       | -             | -   | 100  | -    | -        | -         | -              | -    | --               | Soya Wax  |
| 43     | CAL.18  | 15.0      | 1      | 6          | 13        | 220    | 450      | 2.0    | 20          | 8.4     | 0.41       | -             | -   | 98.9 | 1.13 | 0.89     | -         | -              | -    | --               | Soya Wax  |
| 45     | CAL.20  | 15.0      | 1      | 6          | 14        | 220    | 450      | 2.0    | 20          | 3.4     | 0.17       | -             | -   | 100  | -    | 0.86     | -         | -              | -    | --               |           |
| 47     | CAL.24  | 16.0      | 1      | 6          | 13        | 220    | 450      | 2.0    | 20          | 4.9     | 0.22       | -             | -   | 100  | -    | 0.87     | -         | -              | -    | --               |           |
| 48     | CAL.25  | 15.0      | 1      | 23         | 38        | 220    | 450      | 2.0    | 20          | 9.5     | 0.46       | -             | -   | 99.5 | 0.47 | 0.89     | -         | -              | -    | --               |           |
| 52     | CAL.27  | 15.0      | 1      | 18         | 22        | 220    | 450      | 2.0    | 20          | <1.0    | 0.02       | -             | -   | 100  | -    | -        | -         | -              | -    | --               | Soya Wax  |
| 53     | CAL.28  | 15.0      | 1      | 13         | 15        | 220    | 450      | 2.0    | 20          | 0.5     | 0.03       | -             | -   | 100  | -    | -        | -         | -              | -    | --               | Soya Wax  |

Table VII. M4 SBCR RUN RESULTS

## COMPARISON OF CATALYST ACTIVITY AT SIMILAR RUN CONDITIONS

| Period No. | Temperature | Pressure | H <sub>2</sub> /CO Ratio |
|------------|-------------|----------|--------------------------|
| 1          | 240 C       | 450psi   | 2.0                      |

a) Unless otherwise noted, total flow is ca.15 L/min. STP, or 3 cm/sec linear gas flow.

b) Conversion is total CO conversion over the period (%).

c) Conversion and selectivities are calculated using N<sub>2</sub> as an internal standard in the GC analysis of the

d) Prod. rate: Rate for production of total hydrocarbons, C<sub>1</sub>+ (kg/kg cat.,hr).

e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt,g | Conv. % | Prod. Rate | Selectivities    |                 |                   |                  | Alpha GC | Alpha Liq | Olefin/Paraffin |      | Olefins C6-18,% |
|--------|---------|-----------|---------|------------|------------------|-----------------|-------------------|------------------|----------|-----------|-----------------|------|-----------------|
|        |         |           |         |            | %CH <sub>4</sub> | %C <sub>2</sub> | %C <sub>3</sub> + | %CO <sub>2</sub> |          |           | C3              | C4   |                 |
| 3      | CO.002  | 15.2      | 29.4    | 1.42       | 17.3             | 2.3             | 79.4              | 1.0              | 0.73     | 0.82      | 0.91            | 0.60 | 17.5            |
| 4      | CO.024  | 15.4      | 25.5    | 1.21       | 8.6              | 2.0             | 89.0              | 0.4              | 0.79     | 0.84      | 2.93            | 1.93 | 21.7            |
| 5      | CO.035  | 15.4      | 24.8    | 1.18       | 8.5              | 2.1             | 89.0              | 0.5              | 0.78     | 0.84      | 3.13            | 1.94 | 23.1            |
| 6      | Co.028  | 15.4      | 21.2    | 1.00       | 6.1              | 1.6             | 91.3              | 1.0              | 0.81     | 0.83      | 4.86            | 3.00 | 28.7            |
| 7      | CO.043  | 15.4      | 13.0    | 0.61       | 3.7              | 1.8             | 93.4              | 1.1              | 0.79     | 0.85      | 5.60            | 3.17 | 27.3            |
| 8      | CO.006  | 15.0      | 2.7     | 0.25       | 0.1              | 0.2             | 98.8              | 1.8              | 0.67     | 0.85      | 3.33            | 2.33 | 16.1            |
| 9      | CO.048  | 15.4      | 19.1    | 0.90       | 9.9              | 1.6             | 87.4              | 1.1              | 0.77     | 0.88      | 3.60            | 2.09 | 20.3            |
| 10     | CAL.02  | 15.9      | 34.5    | 1.58       | 12.9             | 2.0             | 83.9              | 1.2              | 0.75     | 0.81      | 1.66            | 1.06 | 21.0            |
| 11     | CAL.03  | 15.6      | 29.7    | 1.39       | 13.5             | 2.1             | 83.4              | 1.1              | 0.74     | 0.86      | 1.65            | 1.03 | 18.2            |
| 12     | CO.053  | 15.9      | 34.2    | 1.56       | 12.6             | 2.0             | 84.2              | 1.2              | 0.75     | 0.83      | 1.60            | 1.00 | 24.5            |
| 13     | CO.054  | 15.7      | 10.4    | 0.48       | 4.7              | 1.8             | 92.3              | 1.2              | 0.78     | 0.86      | 5.75            | 4.00 | 25.9            |
| 14     | BlendA  | 20.0      | 29.3    | 1.41       | 10.1             | 1.6             | 86.3              | 2.0              | 0.77     | 0.86      | 2.23            | 1.35 | 23.1            |
| 15     | CO.034  | 13.0      | 27.5    | 1.54       | 10.4             | 1.6             | 87.2              | 0.8              | 0.78     | 0.84      | 2.21            | 1.40 | 21.0            |
| 16     | CAL.04  | 16.1      | 26.3    | 1.34       | 7.1              | 1.3             | 90.3              | 1.4              | 0.80     | 0.85      | 4.80            | 3.18 | 32.9            |
| 17     | CAL.08  | 15.0      | 16.9    | 0.93       | 5.9              | 1.0             | 91.7              | 1.4              | 0.82     | 0.88      | 5.20            | 3.33 | 28.7            |
| 18     | CAL.07  | 15.0      | 20.6    | 1.03       | 7.7              | 1.2             | 90.0              | 1.1              | 0.81     | 0.88      | 5.00            | 3.00 | 32.2            |
| 19     | CAL.05  | 15.7      | 26.6    | 1.22       | 7.3              | 1.3             | 90.2              | 1.2              | 0.82     | 0.86      | 4.11            | 3.00 | 28.7            |
| 20     | CAL.06  | 15.0      | 5.6     | 0.26       | 3.1              | 2.1             | 92.0              | 2.9              | 0.80     | 0.90      | 4.50            | 3.50 | 30.8            |
| 21     | CO.004  | 15.9      | 39.3    | 1.80       | 15.2             | 2.3             | 81.2              | 1.4              | 0.74     | 0.80      | 1.16            | 0.73 | 23.1            |
| 23     | CAL.09  | 15.0      | 17.4    | 0.84       | 0.0              | 1.2             | 97.9              | 1.0              | 0.83     | 0.88      | 5.40            | 3.33 | 29.4            |
| 24     | CO.053  | 28.5      | 50.4    | 1.28       | 14.1             | 2.1             | 81.8              | 2.0              | 0.75     | 0.79      | 1.14            | 0.68 | 21.7            |
| 25     | CO.056  | 15.0      | 11.4    | 0.55       | 7.8              | 3.6             | 87.2              | 1.4              | 0.67     | 0.87      | 3.60            | 2.30 | 20.3            |
| 26     | CAL.10  | 15.6      | 21.9    | 1.01       | 5.4              | 1.5             | 91.9              | 1.3              | 0.79     | 0.85      | 3.60            | 2.27 | 25.9            |
| 27     | Co.050  | 14.6      | 20.4    | 1.01       | 6.8              | 1.9             | 90.2              | 1.0              | 0.78     | 0.87      | 2.50            | 1.69 | 18.9            |
| 28     | Co.057  | 15.8      | 18.7    | 0.86       | 5.3              | 1.5             | 92.2              | 1.0              | 0.81     | 0.85      | 3.27            | 2.36 | 23.1            |
| 29     | Co.061  | 45.4      | 29.0    | 0.46       | 14.4             | 2.6             | 81.6              | 1.5              | 0.72     | 0.80      | 1.49            | 0.94 | 18.9            |
| 30     | Co.011  | 15.9      | 5.0     | 0.36       | 5.8              | 3.9             | 87.8              | 2.5              | 0.71     | 0.89      | 5.75            | 3.00 | 22.4            |
| 31     | CAL.12  | 15.9      | 27.6    | 1.26       | 7.9              | 1.0             | 90.0              | 1.1              | 0.79     | 0.84      | 3.50            | 2.07 | 25.2            |
| 32     | CAL.11  | 15.9      | 30.6    | 1.40       | 7.8              | 1.4             | 89.6              | 1.2              | 0.80     | 0.84      | 3.91            | 3.33 | 26.6            |
| 33     | CAL.13  | 15.9      | 28.1    | 1.28       | 6.4              | 1.4             | 90.9              | 1.3              | 0.81     | 0.85      | 3.64            | 2.15 | 23.8            |

Note Catalysts for Runs 3 thru 15 (except 8) screened through 150 x 400 mesh.  
Catalyst for Run 8 screened thru 100 x 400 mesh.  
Catalysts Nos. CAL.07-CAL.09 were prereduced and coated with soya wax.  
Catalyst No. CAL.06 was H<sub>2</sub> reduced and air stabilized.  
Catalyst No. Co.061 contains 30 % cobalt.  
H<sub>2</sub> to CO ratio for Runs 16 and 17 was 1.76/1.0.

Table VIII. M4 SBCR RUN RESULTS

## COMPARISON OF CATALYST ACTIVITY AT SIMILAR RUN CONDITIONS

| Period No. | Temperature | Pressure | H <sub>2</sub> /CO Ratio |
|------------|-------------|----------|--------------------------|
| 2          | 220 C       | 450psi   | 2.0                      |

a) Unless otherwise noted, total flow is ca.15 L/min. STP, or 3 cm/sec linear gas flow.

b) Conversion is total CO conversion over the period (%).

c) Conversion and selectivities are calculated using N<sub>2</sub> as an internal standard in the GC analysis of the

d) Prod. rate: Rate for production of total hydrocarbons, C<sub>1</sub>+ (kg/kg cat., hr).

e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt, g | Conv. % | Prod. Rate | Selectivities    |                 |                   |                  | Alpha GC | Alpha Liq | Olefin/Paraffin |      | Olefins C6-18, % |
|--------|---------|------------|---------|------------|------------------|-----------------|-------------------|------------------|----------|-----------|-----------------|------|------------------|
|        |         |            |         |            | %CH <sub>4</sub> | %C <sub>2</sub> | %C <sub>3</sub> + | %CO <sub>2</sub> |          |           | C3              | C4   |                  |
| 3      | CO.002  | 15.2       | 11.8    | 0.56       | 4.7              | 1.0             | 93.7              | 0.6              | 0.81     | 0.90      | 2.71            | 1.63 | --               |
| 4      | CO.024  | 15.4       | 9.5     | 0.45       | 0.0              | 2.1             | 97.6              | 0.3              | 0.83     | 0.91      | 5.33            | 4.00 | --               |
| 5      | CO.035  | 15.4       | 8.8     | 0.42       | 0.0              | 2.3             | 97.4              | 0.3              | 0.82     | --        | 5.33            | 4.00 | --               |
| 6      | CO.028  | 15.4       | 6.6     | 0.31       | 0.0              | 1.9             | 97.4              | 0.7              | 0.83     | 0.90      | 5.50            | 4.00 | --               |
| 7      | CO.043  | 15.4       | 4.3     | 0.20       | 0.0              | 1.4             | 96.3              | 2.3              | 0.81     | 0.91      | 4.00            | 3.00 | --               |
| 9      | CO.048  | 15.4       | 6.1     | 0.28       | 1.8              | 1.0             | 95.2              | 1.9              | 0.80     | 0.91      | 3.67            | 3.00 | --               |
| 10     | CAL.02  | 15.9       | 14.9    | 0.68       | 4.6              | 0.9             | 94.0              | 0.5              | 0.81     | 0.88      | 4.40            | 2.29 | --               |
| 12     | CO.053  | 15.9       | 14.4    | 0.66       | 4.3              | 1.0             | 94.3              | 0.5              | 0.81     | 0.89      | 4.20            | 2.67 | --               |
| 13     | CO.054  | 15.7       | 0.2     | 0.01       | 0.0              | 20.0            | 60.8              | 19.5             | 0.33     | 0.94      | 8.00            | 5.00 | --               |
| 14     | BlendA  | 20.0       | 12.4    | 0.60       | 4.3              | 0.9             | 93.9              | 1.0              | 0.81     | 0.91      | 3.80            | 2.33 | --               |
| 15     | CO.034  | 13.0       | 11.0    | 0.61       | 4.0              | 0.9             | 94.5              | 0.6              | 0.82     | 0.90      | 4.00            | 3.00 | --               |
| 16     | CAL.04  | 16.1       | 8.4     | 0.42       | 2.6              | 1.0             | 94.1              | 2.3              | 0.80     | 0.88      | 5.00            | 4.00 | --               |
| 17     | CAL.08  | 15.0       | 5.4     | 0.28       | 0.1              | 0.8             | 96.9              | 2.2              | 0.83     | --        | 4.00            | 3.00 | --               |
| 18     | CAL.07  | 15.0       | 6.7     | 0.33       | 1.8              | 1.4             | 95.0              | 1.8              | 0.85     | --        | 4.00            | 3.00 | --               |
| 19     | CAL.05  | 15.7       | 9.0     | 0.41       | 2.3              | 1.4             | 94.8              | 1.6              | 0.84     | --        | 5.50            | 3.00 | --               |
| 20     | CAL.06  | 15.0       | 3.5     | 0.16       | 0.0              | 3.3             | 92.8              | 3.9              | 0.80     | 0.85      | 3.00            | 2.50 | --               |
| 21     | CO.004  | 15.9       | 16.1    | 0.74       | 8.1              | 1.2             | 90.2              | 0.5              | 0.78     | 0.86      | 3.38            | 2.22 | --               |
| 23     | CAL.09  | 15.0       | 6.6     | 0.32       | 0.2              | 0.9             | 98.0              | 0.9              | 0.90     | --        | 4.00            | 3.00 | --               |
| 25     | CO.056  | 15.0       | 4.5     | 0.22       | 0.0              | 2.7             | 95.7              | 1.3              | 0.73     | --        | 4.67            | 3.00 | --               |
| 27     | Co.050  | 14.6       | 8.1     | 0.39       | 0.0              | 4.8             | 92.6              | 2.6              | 0.79     | 0.87      | 8.50            | 3.00 | --               |
| 28     | Co.057  | 15.8       | 6.0     | 0.28       | 0.0              | 1.9             | 97.2              | 0.9              | 0.79     | --        | 5.50            | 4.00 | --               |
| 29     | Co.061  | 45.4       | 11.8    | 0.19       | 3.9              | 1.9             | 93.5              | 0.7              | 0.77     | --        | 3.67            | 2.29 | --               |
| 42     | CAL.16  | 15.0       | 1.0     | 0.04       | -                | -               | 100.0             | -                | -        | --        | --              | --   | --               |
| 43     | CAL.18  | 15.0       | 8.4     | 0.41       | -                | -               | 98.9              | 1.1              | 0.89     | --        | --              | --   | --               |
| 45     | CAL.20  | 15.0       | 3.4     | 0.17       | -                | -               | 100.0             | -                | 0.86     | --        | --              | --   | --               |
| 47     | CAL.24  | 16.0       | 4.9     | 0.22       | -                | -               | 100.0             | -                | 0.87     | --        | --              | --   | --               |
| 48     | CAL.25  | 15.0       | 9.5     | 0.46       | -                | -               | 99.5              | 0.5              | 0.89     | --        | --              | --   | --               |

Note Catalysts for Runs 3-21 (except 8), 25-29, and 45-48 screened thru 150 x 400 mesh.

Catalyst for Run 8 screened thru 100 x 400 mesh.

Catalysts Nos. CAL.07-CAL.09, CAL.16 and CAL.18 were prereduced and coated with soya wax.

Catalyst No. CAL.06 was H<sub>2</sub> reduced and air stabilized.

Blend A contains 15.0 g of Cat. No. Co.005 plus 5.0 g of Cat. No. WGS.03

Catalyst No. Co.061 contains 30 % cobalt.

H<sub>2</sub> to CO ratio for Runs 16 and 17 was 1.76/1.0.

Table IX. M4 SBCR RUN RESULTS

## COMPARISON OF CATALYST ACTIVITY AT SIMILAR RUN CONDITIONS

| Period No. | Temperature | Pressure | H <sub>2</sub> /CO Ratio |
|------------|-------------|----------|--------------------------|
| 4          | 240 C       | 450psi   | 1.0                      |

a) Unless otherwise noted, total flow is ca.15 L/min. STP, or 3 cm/sec linear gas flow.

b) Conversion is total CO conversion over the period (%).

c) Conversion and selectivities are calculated using N<sub>2</sub> as an internal standard in the GC analysis of the

d) Prod. rate: Rate for production of total hydrocarbons, C<sub>1</sub>+ (kg/kg cat.,hr).

e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt,g | Conv. % | Prod. Rate | Selectivities    |                 |                   |                  | Alpha GC | Alpha Liq | Olefin/Paraffin |      | Olefins C6-18,% |
|--------|---------|-----------|---------|------------|------------------|-----------------|-------------------|------------------|----------|-----------|-----------------|------|-----------------|
|        |         |           |         |            | %CH <sub>4</sub> | %C <sub>2</sub> | %C <sub>3</sub> + | %CO <sub>2</sub> |          |           | C3              | C4   |                 |
| 3      | CO.002  | 15.2      | 11.6    | 0.83       | 3.9              | 2.4             | 92.8              | 0.8              | 0.81     | 0.87      | 4.29            | 3.14 | --              |
| 4      | CO.024  | 15.4      | 10.3    | 0.73       | 0.5              | 1.6             | 97.2              | 0.7              | 0.83     | 0.87      | 8.33            | 4.75 | --              |
| 5      | CO.035  | 15.4      | 10.4    | 0.73       | 0.9              | 0.0             | 98.4              | 0.7              | --       | 0.83      | --              | --   | --              |
| 6      | CO.028  | 15.4      | 9.2     | 0.65       | 0.0              | 1.3             | 97.3              | 1.5              | 0.85     | 0.88      | 9.50            | 3.75 | --              |
| 7      | CO.043  | 15.4      | 5.2     | 0.37       | 0.0              | 0.0             | 99.4              | 0.6              | 0.83     | 0.89      | 7.00            | 5.00 | --              |
| 9      | CO.048  | 15.4      | 8.2     | 0.57       | 2.3              | 1.0             | 93.8              | 3.0              | 0.82     | 0.90      | 8.50            | 4.33 | --              |
| 10     | CAL.02  | 15.9      | 14.6    | 1.00       | 4.6              | 1.0             | 93.3              | 1.0              | 0.80     | 0.88      | 7.20            | 4.00 | --              |
| 12     | CO.053  | 15.9      | 13.3    | 0.91       | 4.3              | 1.2             | 93.3              | 1.2              | 0.80     | 0.89      | 6.60            | 3.71 | --              |
| 13     | CO.054  | 15.7      | 5.2     | 0.36       | 0.0              | 1.2             | 97.0              | 1.9              | 0.83     | 0.95      | 6.00            | 4.50 | --              |
| 14     | BlendA  | 20.0      | 12.7    | 0.91       | 3.4              | 1.0             | 94.0              | 1.6              | 0.81     | 0.86      | 7.50            | 3.83 | --              |
| 15     | CO.034  | 13.0      | 11.2    | 0.94       | 3.9              | 1.0             | 94.0              | 1.0              | 0.82     | 0.87      | 8.33            | 4.00 | --              |
| 21     | CO.004  | 15.9      | 14.9    | 1.02       | 7.4              | 1.4             | 89.9              | 1.3              | 0.77     | 0.84      | 4.67            | 2.82 | --              |
| 27     | Co.050  | 14.6      | 8.4     | 0.61       | 1.1              | 2.9             | 93.3              | 2.8              | 0.79     | 0.90      | 6.25            | 5.00 | --              |
| 28     | Co.057  | 15.8      | 8.1     | 0.56       | 1.3              | 4.6             | 92.7              | 1.4              | 0.79     | --        | 7.33            | 5.67 | --              |

Note Catalysts for Runs 3 through 28 screened thru 150 x 400 mesh.

Table X. M4 SBCR RUN RESULTS

## COMPARISON OF CATALYST ACTIVITY AT SIMILAR RUN CONDITIONS

| Period No. | Temperature | Pressure | H <sub>2</sub> /CO Ratio |
|------------|-------------|----------|--------------------------|
| 5          | 240 C       | 600psi   | 1.0                      |

a) Unless otherwise noted, total flow is ca.15 L/min. STP, or 3 cm/sec linear gas flow.

b) Conversion is total CO conversion over the period (%).

c) Conversion and selectivities are calculated using N<sub>2</sub> as an internal standard in the GC analysis of t

d) Prod. rate: Rate for production of total hydrocarbons, C<sub>1</sub>+ (kg/kg cat.,hr).

e) Alpha: Based on GC analysis of offgas and liquid product.

| Run No | Cat. No | Cat. wt,g | Conv. % | Prod. Rate | Selectivities    |                 |                   |                  | Alpha GC | Alpha Liq | Olefin/Paraffin |      | Olefins C6-18,% |
|--------|---------|-----------|---------|------------|------------------|-----------------|-------------------|------------------|----------|-----------|-----------------|------|-----------------|
|        |         |           |         |            | %CH <sub>4</sub> | %C <sub>2</sub> | %C <sub>3</sub> + | %CO <sub>2</sub> |          |           | C3              | C4   |                 |
| 3      | CO.002  | 15.2      | 12.9    | 0.92       | 4.0              | 1.5             | 93.5              | 0.91             | 0.81     | 0.82      | 4.29            | 2.75 | 24.5            |
| 4      | CO.024  | 15.4      | 11.3    | 0.80       | 0.9              | 1.5             | 97.0              | 0.65             | 0.83     | 0.87      | 6.50            | 3.80 | 36.4            |
| 5      | CO.035  | 15.4      | 10.7    | 0.76       | 0.7              | 1.4             | 97.1              | 0.75             | 0.84     | 0.88      | 6.25            | 4.50 | 27.3            |
| 6      | CO.028  | 15.4      | 9.5     | 0.67       | 0.0              | 1.1             | 97.5              | 1.36             | 0.85     | 0.88      | 6.00            | 3.50 | 40.6            |
| 7      | CO.043  | 15.4      | 5.9     | 0.41       | 0.0              | 2.2             | 94.8              | 2.99             | 0.82     | 0.89      | 6.00            | 3.75 | 30.1            |
| 9      | CO.048  | 15.4      | 11.9    | 0.83       | 2.7              | 0.9             | 94.4              | 1.93             | 0.84     | 0.89      | 5.75            | 3.20 | 14.0            |
| 10     | CAL.02  | 15.9      | 16.4    | 1.12       | 4.2              | 1.0             | 94.0              | 0.89             | 0.82     | 0.86      | 5.83            | 3.86 | 35.7            |
| 12     | CO.053  | 15.9      | 15.6    | 1.06       | 4.0              | 0.9             | 94.0              | 1.00             | 0.82     | 0.87      | 5.50            | 3.57 | 32.2            |
| 13     | CO.054  | 15.7      | 5.0     | 0.34       | 0.0              | 1.3             | 96.9              | 1.78             | 0.82     | 0.93      | 6.50            | 3.33 | 30.8            |
| 14     | BlendA  | 20.0      | 14.1    | 1.02       | 3.7              | 1.0             | 93.8              | 1.45             | 0.82     | 0.89      | 6.40            | 3.43 | 32.9            |
| 15     | CO.034  | 13.0      | 11.8    | 0.99       | 3.9              | 1.1             | 94.0              | 1.03             | 0.83     | 0.87      | 5.75            | 3.80 | 37.8            |
| 21     | CO.004  | 15.9      | 18.4    | 1.26       | 6.1              | 1.1             | 91.9              | 0.94             | 0.81     | 0.84      | 5.25            | 2.91 | 32.2            |

Note Catalysts for Runs 3 through 21 screened thru 150 x 400 mesh.